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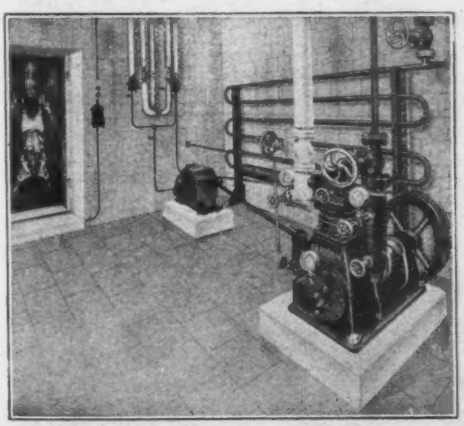

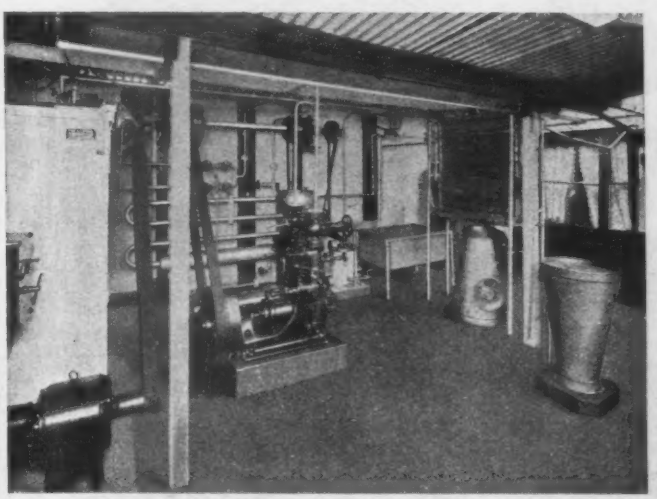

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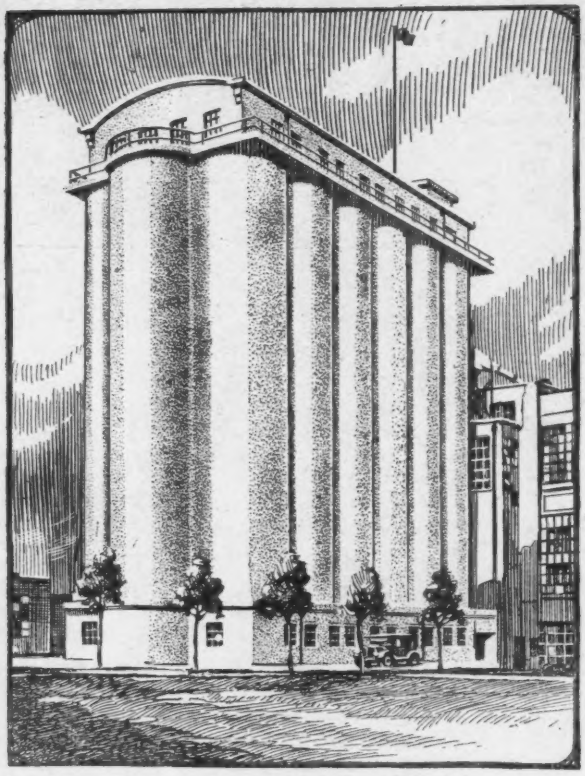

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Food Manufacture

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The editor will be glad to consider contributions from those engaged in the Food Industry. Articles intended for publication should be of a practical nature and accompanied by photographs or drawings whenever possible.

January, 1928

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U.S. Packing Industry.

AT THE annual convention of the Institute of American Meat Packers at Chicago, T. E. Wilson described how education and research are being employed by the packers to meet the new competition which has arisen during recent years between whole industries. Many economies have been effected by study of plant operating methods and technique—for example, a study of the coal consumption per head of live stock dressed in different plants revealed startling variations, and as an outcome of this, some companies succeeded in greatly reducing their fuel cost.

We might remark, in passing, that scientific analysis of fuel costs in very many other factories, besides meat factories, would reveal facts equally startling. This is one department, and perhaps the most important, of scientific control as applied to food manufacture. A few inexpensive instruments in the hands of a young man of the necessary ability have frequently been the means of reducing working costs by several thousands of pounds a year.

Mr. Wilson then went on to say that, by standardisation of factory equipment, it had been found possible to effect further substantial economies. Another useful practice yielded a number of mechanical innovations—namely, the stimulation of inventive genius within the industry by cash awards for bright ideas.

Looking Ahead.

During the past four years a great deal has been accomplished in establishing courses of instruction for the young packer. Last year, more than one thousand men took courses in packing-house subjects, some in the Institute of Meat Packing at the University of Chicago, some in evening schools at various centres, and some by correspondence.

"While training of this sort is of tremendous direct value to an industry," Mr. Wilson stated, "the fact should not be overlooked that it also is a real benefit to the men and gives them opportunities for advancement and accomplishment that they perhaps otherwise would not have enjoyed. The mere fact that during the last few years it has been possible to establish a literature of the industry by recording the best practice of the industry—information which previously existed only in the minds of a relatively small number of men and which was passed on by word of mouth—will make the future a great deal easier for young men who enter the industry than for those of us who, years ago, had to learn largely by the tedious process of our own experience."

The Soft Pork Problem.

The U.S. Department of Agriculture has recently supplied additional support to the contention that

soft pork is primarily the outcome of fat in the feed. They find that if there is a total fat content of the feed very much in excess of 6 per cent., soft pork is likely to result.

This is, of course, a very general and simplified statement of a complex problem. Readers interested in the matter should turn to our previous remarks (Vol. I., p. 34) and to F. W. Jackson's article (Vol. II., p. 172).

Naturally, the soybean growers are interested, seeing that varieties of the bean vary in oil content from 12 to 24 per cent., and the U.S. Department of Agriculture has recommended them to make efforts to produce two distinct strains, by breeding and selections; one suitable for stock feeding and the other for bean milling.

Pectin and Candy.

The use of pectin in the preparation of jam and jelly candies offers plenty of scope for ingenuity. From a practical point of view, pectin is, of course, the peculiar substance which forms in fruits as they mature, and which causes a pure fruit juice to form a jelly when mixed with sugar and cooked to the proper concentration. Commercial pectins in both liquid and powdered form can be purchased, and are of considerable assistance to the jam manufacturer. Experience is required to arrive at the most suitable proportions of sugar, acid, and pectin in the preparation of jams and jellies. If the acid is correct and the sugar and pectin are both high, the product will be hard and tough. If the sugar, acid, or pectin is deficient the jelly will be soft and easily broken down. If the acid is high, the jelly will have a tendency to bleed or sweat excessively.

The confectioner may make a series of trials with pectin, and to serve as a basis some recipes are quoted in the next paragraph. In each trial he should take care to measure all ingredients, to use the thermometer, to cook fruit jams and jellies rapidly, and to use fully ripe fruit.

Jams and Jellies for Candies.

Mix 2 ozs. of powdered "No. 80" apple pectin with 12 ozs. of granulated sugar in a dry pan or pail. Transfer to a dry kettle, and (for plain pectin jellies) gradually add 2½ quarts of water while stirring. When a smooth syrup is obtained, turn on the steam and bring to boiling point without stirring. Then add 5¾ lbs. of granulated sugar and 1 lb. of corn syrup or Nulomoline. Continue boiling until a temperature of 221° to 222° F. (at sea level) is reached. Then turn off the heat and add 1 to 2 ozs. of acid solution (made by dissolving 1 lb. of tartaric acid in 1 quart of water) just before pouring on to the slab. When casting in starch or making plastic candy centres, use 1¾ ozs. of the pectin instead of 2 ozs. When preparing a jam to be used in plastic goods, it may be necessary to use more corn syrup or Nulomoline and less sugar.

The plain pectin jelly thus produced is an ideal base for various flavour and colour combinations, which should be added just before the acid. For fruit juice jellies, 2½ quarts of fruit juice are substituted for the 2½ quarts of water. In the case of fresh fruit jams and canned fruit jams, 4 lbs. of fruit are used. The pulp should be added and the mass again brought to a boil before adding the 5¾ lbs. of sugar and the corn syrup.

We are indebted to W. A. Rooker, of Kansas City, and to the *Fruit Products Journal* for the above recipes.

Pectin and Jam.

Whilst on this subject of pectin, it is perhaps as well to remind jam makers that it has now been decided by the courts that jam containing added pectin or fruit juice of other fruit must be labelled accordingly, however small the amount. This has been a doubtful point for some years.

It is rather curious to note that cases still continue to come up of boric acid in sausages and sauce, and of formaldehyde in milk. Also, the label question is disregarded in some instances.

Appetising Sausages.

The avoidance of cheap peppers, and the use of black in preference to white pepper, in sausages are points to be borne in mind in producing good colour and flavour. It has been recommended to use the best red pepper, since this enhances the attractiveness of the product by imparting a warm colour, as well as a pleasant and appetising flavour.

Milk Transport.

Attention has been drawn in the Press to glass-lined tanks for conveying milk. Such tanks are extensively used in America. They are made to hold several thousands of gallons for rail transport, and smaller quantities for road transport. The tanks are constructed of steel, lined with dark blue glass-enamel, and are so arranged that they can be washed and sterilised after each journey. They are insulated with corkboard.

A set of tests gave some interesting results. It was found that the temperature of 1,000 gallons of milk after a journey of about 700 miles, lasting 60 hours, had risen from 36° F. to 41° F. only. The acidity of the milk was 12·7, instead of 17 or 18, and its bacterial count was 7,000 and 12,000 for two different samples.

Bottled Milks.

In this connection one is reminded of some remarks recently made by Blackburn's Medical Officer of Health. Calling attention to the dangers of plain, bottled milk, he contended that promiscuous bottling is going on, sometimes in places unfit for the purpose, and yet, simply because the milk is bottled, purchasers may be under the impression that it is grade A milk. Plain, bottled milk he defines as ordinary milk, clean or dirty, tubercle free or tubercle infected, as the case may be, which has been poured into bottles. Designated milks have their designation clearly indicated on the cap of the bottle.

Fruit Transport.

Experiments have been conducted in Russia with the object of ascertaining the best way of conveying fruit in a sound condition. A ventilator-exhauster drew air from the waggon, and this air then passed through ice-boxes (loaded with ice, to which had been added 5 to 10 per cent. of salt), and was returned to the waggon. The temperature of the outside air was 127° F., whilst that of the fruit when loaded was 89·6° F. After a journey of eight days, the temperature of the fruit was found to have been reduced to 41° F., and its condition was quite sound. This system is understood to be working quite satisfactorily at the present time in many parts of Russia.

Physics and Food Industry.

An interesting lecture was recently given by Sir William Hardy, Director of Food Investigation of the Department of Scientific and Industrial Research, on the relation of physics to the food industry.

It was pointed out that the storage of food was primarily a biological problem. For successful storage, fruit had to be kept alive; the temperature and humidity of the air had to be regulated carefully, and there were practical difficulties that had not been overcome.

The lecturer dealt at some length with the two refrigeration processes, chilling and freezing, used for the preservation of animal and vegetable products. In chilling, the formation of ice is avoided; the temperature is kept as near freezing point as possible, thereby delaying the attacks of bacteria and moulds. This process has its limitations set by the short period of time during which it is effective. It is successful in the conveyance of meat from Argentina, but not from Australia. Freezing is more certain, and is effective for longer periods. Unfortunately, it has not yet been successfully applied to all meats. It is satisfactory with mutton, lamb, some fish, and with butter, but not with beef. Freezing kills fruit, and so is not applicable.

Psychology of Toffee Wrapping.

One of the most noticeable developments in modern industrial conditions has been the gradual displacement of manual labour by the machine. As a result, a number of special problems have arisen, especially in connection with machine speeds and the ability of the operatives to keep pace with them. The operative may be imperfectly adjusted to the requirements of the machine, or *vice versa*.

To obtain some data bearing on these questions, S. Wyatt, Investigator to the Industrial Fatigue Research Board, carried out a series of tests in a machine wrapping department of a toffee factory. An account of Mr. Wyatt's experiments and observations are contained in the October number of *The Journal of the National Institute of Industrial Psychology*. We reproduce his summary and recommendations, which will prove of considerable interest to manufacturers.

Results of the Research.

The facts ascertained show that under ordinary industrial conditions the operatives were unable to approach their maximum rate of working because of the limitations imposed by the speed of the machines. When the machine speeds were increased for experimental purposes the operatives responded successfully to the additional demands until the speed exceeded the original rate by approximately 18 per cent.; and there is little doubt that some of the more efficient workers were capable of coping with still higher speeds. In any group of individuals selected at random, considerable differences in ability will be found to exist. It is quite common, for instance, to find differences in efficiency amounting to 30 or 40 per cent. in repetitive handwork, where working capacity can be fully expressed in productive activity. In the present factory, the operatives of superior ability were reduced almost to the level of the least efficient workers.

Mr. Wyatt's Recommendations.

Ideally, the speed of the machines should be so arranged that they constitute a progressive series (in the present case from 50 to 90 per minute). Under such an arrangement, novices, during the early stage of the learning period, could be assigned to the slowest machines, and would have little difficulty in keeping them supplied with toffee. As soon as they approached an efficiency of 100 per cent. (calculated on the basis of due allowance for unavoidable stoppages) they should be promoted to machines running at 55 per minute, and so on until they eventually arrive at machines having a speed which harmonises with their final rate of working. Such a scheme would provide a natural and reason-

able system of promotion, with its accompanying incentives to activity, and would eventually result in each operative finding a machine adapted to her natural rate of working. Individual differences in ability would in consequence be adequately expressed in productive efficiency, and each operative would be most comfortably and effectively employed.

Dried Milk.

The infant welfare centres of West Ham are advocating the use of dried milk, and they have issued a circular on the subject. Here are some points brought out in this circular:

Dried milk is a valuable food and can be preserved for considerable time with practically unimpaired food value. It is less liable to bacterial changes than fresh milk, and the process of drying reduces the number of bacteria present. It is claimed that scurvy and rickets are rare in infants fed on dried milk, and that mortality figures are less than with ordinary milk.

English Canning.

From American sources it is reported that our imports of canned raspberries and strawberries from the United States are steadily diminishing, owing to greater progress being made by English canners.

It is also reported that the English taste for canned beans and pork with tomato sauce is growing. While Canadian firms are doing some business, the bulk of the imports are American.

Recent pure food legislation forbidding the use of copper sulphate as a colouring agent have cut down imports of canned peas from the Continent, formerly the chief source of supply. Canadian packers are endeavouring to fill the breach.

Brazilian Canning Industry.

The Brazilian market for canned fruits and vegetables is rather limited, according to a letter of September 6 from the American Consul of Rio de Janeiro, Brazil. This is due chiefly to the facts that transportation charges and high customs duties make these products very expensive in a country where the standard of living is comparatively low, to the preference for fresh fruits and vegetables, and to the lack of a wide campaign encouraging the use of the canned products. Practically the only fruit canned in Brazil is the peach, which is grown in Rio Grande do Sul and one or two other southern States. Although the canning of peaches is relatively an important industry, the quantity is not large, and appears to be insufficient for the Brazilian requirements, since there are some imports and no exports of this commodity, as far as it has been possible to ascertain. Large quantities of paste made from bananas, guava, peaches, pears, etc., are canned and are, for the most part, consumed within the country, chiefly as dessert or with cheese. These products, however, should not offer direct competition to fruits canned abroad. The canning of vegetables in Brazil is quite negligible.

Forthcoming Articles

Colouring Matters in Food.—F. W. Andrews.

Looking Backwards.—An Old Sugar Boiler.

Factors Influencing the Baking Properties of Flour.—T. H. Fairbrother.

Tin Plate in the Canning Industry.—H. Serger.

Climate and Candy.—R. H. Morgan.

The Efficiency of Fuels, Part II.—"H.I.M.E."

The Candying of Fruit.—W. V. Cruess.

Fish Curing.—W. E. Gibbs.

Eggs: Production, Grades, Preserving, Uses.—T. G. Joyce.

Power Economy in the Food Factory.—"Kilowatt."

Scientific Control in the Flour Milling Industry.—C. W. Herd.

Gelatine, Part II.—P. I. Smith and K. Pearson.

Margarine Manufacture.—Paul Arup.

Fruit Juice Powder.—H. Lüthje.

Experiments of Interest to Canners.—W. V. Cruess and J. Parcell.

The Rôle of Pure and Applied Science in Industry.—Dr. Callow.

Colloid Chemistry and Food Technology.—Dr. W. Clayton.

The Salmon Canning Industry.—Dr. E. D. Clark.

Hints on the Origin and Prevention of Humidity Troubles in a Chocolate Factory

By J. VALENTINE BACKES, A.R.C.Sc., A.I.C., D.I.C.

Air that is excessively damp can bring in its trail much trouble to the manufacturing and retailing confectioner. A closer survey of the many ways of counteracting adverse conditions and co-operation in establishing more adequate preventative measures, should be to the mutual benefit of manufacturer and retailer in fighting this evil.

HUMIDITY, OR moisture in the air, is one of the biggest nuisances which manufacturing and retailing confectioners have to face. It is a condition oftentimes difficult to detect, and infinitely more difficult to prevent or obviate. It is truly British, for the English climate is its "Alma Mater." In a word, humidity is a damp nuisance.

It is surprising what damage to goods and resultant loss of trade is brought about by excessive humidity. Sugar bloom, as is well known, is the greatest trouble from the chocolate standpoint, while sweating and "graining" of boiled goods and candies claim the other side of the trade. Yet another trouble arising from excessive humidity which claims all confectionery alike (and most foodstuffs for that matter) is mould. This is not generally realised, and more often than not, the fact that anything has gone mouldy is put down to staleness. The ordinary air is polluted with mould spores, and given a suitably humid air they will develop and grow anywhere. Thus the walls in a cellar often are covered with mould. The spores, however, need food and so will develop more rapidly on goods containing fat and sugar. This rate of development is extraordinarily rapid. From experiments it has been shown that mould is and can be brought to a well developed stage within a period of thirty-two days on chocolates or the like which are packed in a box and stored in an atmosphere of 90 per cent. relative humidity for nine days. This point should be borne in mind by the retailer who may be tempted to store goods in the cellar under the pretext that it is cooler. Goods should never be stored in the cellar unless conditions are ideal, and the air, on testing with a hygrometer, is found to be relatively dry. Mr. T. Macara, F.I.C., has written a very useful article on "The Storage of Chocolate" (*Confectionery Journal*, May 27, 1927) in which, in addition to describing the causes and the formation of sugar bloom on chocolate, he gives a lucid explanation of the term "humidity," together with information about hygrometers and their use in this connection. This article was based on the results of investigations into the cause and prevention of bloom which were carried out by the British Association of Research for the Cocoa, Chocolate, Sugar Confectionery, and Jam Trades. A summarised series of "Hints on the Storage of Chocolate" in the form of "Don't's" was published in the following number of the *Confectionery Journal*. These two articles should go far to help the retail side of the trade.

In this article it is hoped to show how the manufacturer can help to guard himself against humidity troubles.

Air Conditioning

It is to be admitted that air conditioning is the ideal safeguard against excessive humidity. By this means the air is standardised and automatically controlled no matter what the outside conditions may be. Thus nothing but air of the required humidity exists in a department which is air conditioned. The air in such a department is fed in through a conditioning plant and all outside air is excluded. The principle of drying the air is to pass it over refrigerator coils. The air is thus chilled, with the result that moisture in excess of that which it is capable of carrying at that low temperature is deposited. Thus air emitted will contain less moisture than it did prior to freezing, with the result that the humidity is reduced. The air is then warmed up to the required degree before being circulated round the department. The whole, of course, is automatically controlled. With this system it is seen that air of low relative humidity and of the required temperature permeates the department, under which conditions, humidity troubles cannot exist.

For information on air conditioning one should apply to any of the reputable firms who specialise in it—as the Carrier Engineering Co., Ltd., or the Aerozon Air Conditioning Co., Ltd.

Air conditioning, although ideal, is expensive. The object here is to bring to light the many sources of humidity defects and give some methods of obviating them, outside installing an air conditioning plant. It is to be admitted that much of the foregoing will be obvious information, but it is hoped that by grouping together all the sources of humidity troubles which chocolates are likely to experience in their factory life, it will be of some assistance in establishing more adequate control throughout the works.

The humidity of the air in the factory is a point of no mean importance. It has been shown by the Trade Research Association that certain types of chocolate will actually absorb moisture from an atmosphere of 77 per cent. relative humidity—*i.e.*, air containing 77 per cent. of the total weight of water it is capable of carrying in the vapour state at that specific temperature. Thus chocolates can deteriorate in appearance by simply being exposed or subjected to an atmosphere of this humidity, which it must be noted is below saturation. For chocolate the relative humidity should never exceed 75 per cent.

In the case of boiled goods this absorption of water is more apparent, for the goods soon become sticky. Absorption takes place in air of much lower relative humidity—somewhere in the neighbourhood of 60 per cent. Consequently the air in a department where boiled goods are liable to be exposed must be comparatively dry. This is met to a certain extent by rapid bottling of boiled goods in air-tight jars. If the best results are to be obtained, however, this bottling must be done in a dry atmosphere.

The first points for consideration are:

1. The keeping of the relative humidity of the air of the factory down to a minimum.

2. The avoidance of large fluctuations of temperature which may give rise to deposition of moisture from humid air.

3. The steps to be taken when humidity is inadvertently high.

The Keeping of the Relative Humidity to a Minimum.

1. Install hygrometers (*i.e.*, instruments for detecting moisture in the air) in all departments where goods are liable to remain for some time (packing-rooms, stock-rooms, etc.), or where they are liable to experience rapid changes of temperature (enrobing departments, etc.).

The installation of an instrument for measuring the moisture in the air is the only way of detecting the presence of excessive humidity. If an ordinary wet and dry bulb hygrometer is used, do not hang it flush on a wall, but suspend it from the ceiling so that the air can circulate all round it. These instruments should be referred to constantly and a daily record taken, if a recording type is not used. By this means the relative humidity of the whole factory is recorded from day to day and is invaluable to the manufacturer.

2. Eliminate all sources of water from chocolate department:

(*a*) Fill fire buckets with dry sand—not water. Fire buckets filled with water give rise to constant evaporation and so increase the moisture in the air.

(*b*) Do not attempt to wash floors, etc., of chocolate departments on days when humidity is high.

The washing of floors increases the amount of moisture in the air. It is advisable to wash the floors on dry days, unless it can be assured that no goods are exposed on the department at the time.

The Avoidance of Large Fluctuations of Temperature.

Fluctuation of temperature is the confederate of humidity. The maximum amount of water which can be held as vapour in the air varies for each degree of temperature, the amount decreasing as the temperature falls. Air at 65° F. can carry 6·84 grains of water per cubic foot volume, whereas at 55° F. it can only carry 4·87 grains. Thus if, say, the stock-room temperature falls to 55° F. at night, any water in excess of 4·87 grains per cubic foot which the air contained will be deposited on the goods, causing the resultant defects. Air of 71 per cent. relative humidity at a temperature of 65° F. carries 4·85 grains of water per cubic foot. Thus if the room atmosphere is over 71 per cent. relative humidity at a temperature of 65° F. deposition of moisture must take place when the temperature falls to 55° F. or lower.

Furthermore if the cold spell lasts, the goods in time will be reduced to this low temperature. Thus if a warm moist spell follows the cold, the chocolates, etc., will act as condensers for the moisture in the air and cause similar trouble—loss of gloss, sugar bloom, etc. It is, therefore, necessary to keep the temperature constant *day and night*, for by so doing the risk of moisture deposition is reduced to a minimum.

In winter, warm up the departments by the circulation of warm air. This can be done by blowing air, by means of a fan, over an electric heater which can be automatically controlled by a control thermometer. The heating is thus reduced or increased according to the rise or fall of the room temperature and so a constant is maintained.

Steps to be taken when Relative Humidity is Inadvertently High.

1. Where possible raise the temperature of the department a few degrees.

By this means the air, becoming warmer, is capable of carrying more moisture and hence is not so liable to deposit it. This, however, must be carried out with caution, dependent on the department and the goods therein. In no case should the temperature be raised above 70° F.

2. Reduce the number of persons per cubic area to a minimum.

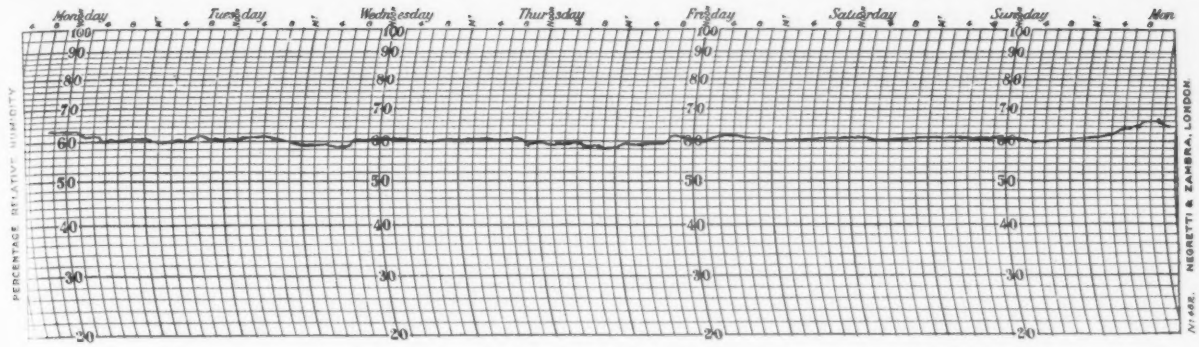
To appreciate this point it must be borne in mind that each person emits approximately 750 grains of moisture per hour doing normal non-perspiratory work. Thus if there are, say, 60 girls in a packing-room the amount of moisture emitted by them into the air by expiration is 45,000 grains approximately, which is over half a gallon per hour. If the air space in the room is relatively small it can be seen that the air, already of high humidity, will soon become saturated with moisture, and at the slightest fall of temperature, moisture will be deposited on the goods. This explains why goods can lose their gloss during the luncheon hour. When the girls leave the department the temperature falls and if the air is of high relative humidity or approaching saturation point, deposition of moisture will take place on the goods.

Thus it is important not to overcrowd departments. It is not so much a question of the number of persons per *cubic capacity* of a room as the number of persons relative to the *air volume* of a room. A room may have a large cubic capacity but a relatively low air volume due to displacement by boxes, cupboards, packing material, etc., stacked in the room.

Hence by reducing the staff for the time being when the relative humidity is high, the amount of moisture emitted into the air is reduced and the humidity lowered.

3. See that ventilation is good.

Good ventilation ensures constant changes of air. Here again caution is necessary. Do not admit out-



A typical Chart from a Recording Hygrometer in a Packing-Room. Note the even Relative Humidity Day and Night, and also the slight Fluctuations during the Hours of Working—*i.e.*, 8 a.m. to 6 p.m. Monday to Friday.

side air on cold, damp, or foggy days. So arrange the ventilation in these cases that the air is drawn from the staircases and other parts of the factory. In this way the air will be tempered before reaching the department. This, of course, refers primarily to packing departments and stock-rooms.

The points so far dealt with are applicable to all departments where goods are being packed or liable to remain for any length of time. They apply to the humidity of what may be termed the *general* air of the factory. The next point to be considered is the humidity of what we may call the *confined local* air—*e.g.*, the air inside a closed box of chocolates. This is particularly important, for the humidity of the air in every box cannot be tested by the packer, and once the box is closed the air inside will take some time to reach an equilibrium with outside conditions. Thus if this "local" air attains a high relative humidity it is liable to be retained and so cause damage. The one thing to do, therefore, is to take every precaution to prevent the air inside the box attaining a high relative humidity.

The air space in a box of chocolates is small. Thus it only requires a very small amount of moisture to bring this small volume to saturation point. There are many ways this small amount of moisture can find its way into a box—*e.g.*, paper shavings, packing materials, gum from the box, etc. These points together with humidity characteristic to individual departments are dealt with under the title headings of the various departments.

Enrober-Room and Covering Department

The temperature of the enrober-room is necessarily high, consequently the air will be carrying more moisture. This moisture is liable to be deposited on any cold goods. Hence "centres" must not be brought direct from a comparatively cool moulding department into the enrober-room without first tempering them.

At the cooling end of the enrober department, humidity plays a big part and if excessive can cause much damage. Here it is that the chocolates immerge from the cooling ducts and as a result of passing through a cold atmosphere will be colder than the room temperature. Thus if the air is of high relative humidity, moisture will be deposited on the surface of the chocolates, thereby destroying their gloss and possibly give rise to sugar bloom. The relative humidity of this department should be kept down to 70 per cent., for assuming the temperature of the chocolates immerging from the cooling ducts to be as low as 50° F., air at a temperature of 60° F. having a relative humidity of 70 per cent. will not deposit moisture.

In cases where the relative humidity exceeds this figure the procedure of raising the temperature of the department two or three degrees to reduce it, can only be applied within narrow limits and with caution.

Where the chocolates are run off the enrober into a refrigerated chamber or room, the goods when removed must be gradually brought up to the temperature of the outside air by first passing into a tempering-room. The temperature of this room should be midway between that of the refrigerator and the outside air. The humidity must be kept low as before if deposition of moisture is to be prevented. This applies also to moulded goods for which refrigerators are used.

Temporary Packing

Where the goods leaving the enrober are packed in wooden stock boxes, care should be taken that these boxes are quite dry. It is advisable to pass them through a drying-room if necessary.

Another source of humidity trouble at this stage may arise from the paper linings of these boxes. As a rule the unglazed paper used is inclined to be very absorbent. A laboratory test on the water content of this paper would be helpful to detect excessive moisture. In those cases where the paper "linings" are stuck down to act as covers, the paste or gum must be used as sparingly as possible, owing to their high water content.

These points may seem trivial in themselves, but collectively they can bring about saturation of the air in the box and so cause damage.

The Stock-Room

This department, carrying as it does the output of the factory, demands more attention than any other. If anything goes wrong here, it is not a day's output from one department that is spoilt, but possibly two or three weeks' output of the entire factory.

The selection of position goes a long way in checking humidity troubles. It should be so placed as to avoid excessive sunshine in the summer (a simple procedure in England), and at the same time must not be exposed to the cold winds and weather for the remaining (eleven!) months of the year. The selection of a good position prevents drastic fluctuations of temperature, which is the cause of most of the trouble in this department. A constant steady temperature round about 60° F. should be maintained *day* and *night*. The maintenance of constant temperature reduces humidity troubles to a minimum. Any warming system which is installed must be so arranged that no direct heat comes in contact with the goods. In winter, as previously mentioned, it is preferable to circulate warm air blown from fans over electric heaters which are automatically controlled. To reduce excessive humidity, the most satisfactory method is to dry the air which is being circulated by first passing it over brine pipes. Drying agents such as trays of calcium chloride, silica gel, and the like all have their advantages, but to say the least of them they are untidy, littered around a department, and not so efficient as the suggested air circulation. Still they are better than nothing at all.

The Packing Department

The points respecting humidity control affecting this department have already been dealt with elsewhere. The only remaining point here is the boxes and packing material. Boxes which are paper-faced must be given a chance to dry out prior to packing. The glue used for sticking the paper to the cardboard contains a high proportion of water. If the paper is a glazed one, this water will not have much chance to escape, but will be absorbed by the cardboard. As is generally done in box factories, the lids are fixed to the box as soon as completed, and any moisture coming from the glue is retained inside the box. It is therefore necessary to dry out these boxes prior to packing, by removing the lids and allowing them to remain open for a day or so in a room of low humidity, or better still dry them in a current of air. It is needless to say that they must not be dried with *hot* air, for the cardboard would contract and spoil the box.

Paper shavings, etc., can, with advantage, be dried in a hot room (100° F.). Paper "runners," cups, etc., should all be tested for undue moisture.

The noting of these minor points will prevent the humidity of the "local" air inside the closed and finished box from increasing. Any one of these things can supply the small amount of moisture necessary to saturate the small volume of air inside the finished box of chocolates, and as stated in the earlier part of this article, humid conditions are not conducive to producing the best effects in the goods on which the manufacturer has expended so much trouble to produce.

Conclusions

To conclude: Most of the points raised are already provided for throughout factories. Many of the larger manufacturers have installed air conditioning plants. It only goes to show how important the control of humidity really is. It is something which must have the consideration of manufacturer and retailer alike. The manufacturer, from vast experience, is already doing all he can from his side. The retailer, less familiar with the term "humidity" (yet more familiar with its effects), is realising and practising the "Do's and Don't's" of proper storage. The close co-operation of both will do much, not only to their own mutual benefit, but in enlarging the already wide circle of a satisfied public.

(*Continued from page 234.*)

Pharmacy

Important applications of gelatine in pharmacy are in the preparation of formo-gelatine, an antiseptic product employed as a surgical dressing, also the manufacture of capsules and court plasters. "Lamellas" are discs of gelatine with some glycerine, weighing $\frac{1}{50}$ to $\frac{1}{30}$ grain, and containing a minute dose of some powerful alkaloid. They are dissolved in water for ophthalmic and hypodermic use; four kinds are specified in the *British Pharmacopœia*.

Photography

In photography a considerable amount of the highest quality gelatine is used as a coating upon films, plates, and developing papers. S. E. Sheppard, Eastman Kodak Co., Ltd., has extracted from gelatine a substance which he calls gelatine "X." This chemical is claimed to be the "actual sensitising agent," and is allyl mustard oil. Photographically active gelatines are estimated to contain from 1 part per million to 1 part per 300,000 of the sensitising agent. Gelatine is incorporated with soluble bichromate salts in photo-lithography.

As a culture medium gelatine finds a ready application in bacteriology. In microscopy it is also used in the preparation of glycerine jelly for mounting specimens.

Forthcoming Exhibitions

January 17 *to* 26.—Birmingham and Midlands Grocers and Allied Trades Exhibition, Bingley Hall, Birmingham. Apply to General Manager, 207-210, Daimler House, Paradise Street, Birmingham.

January 18 *to* 28.—Dundee Grocery and General Trades Exhibition. Apply to Provincial Exhibitions, Ltd., City Hall, Manchester.

February 28 *to March* 8.—"Daily Dispatch" Chocolate and Sweets Exhibition, Manchester. Apply to Provincial Exhibitions, Ltd., City Hall, Manchester.

Gelatine

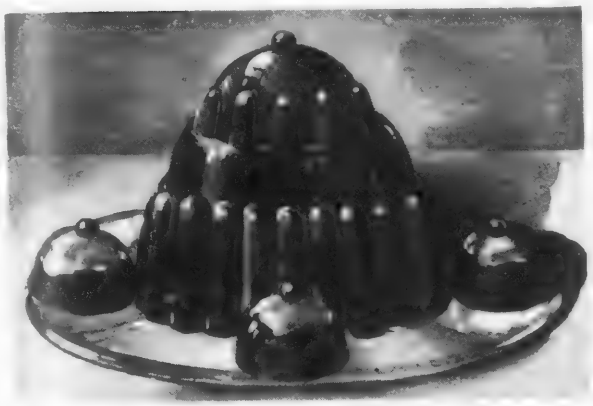
By KATHLEEN PEARSON, S.R.N.,
Matron, Children's Sunlight Home, Stillorgan, Ireland,

AND

PAUL I. SMITH,
First-class Diploma in Leather Manufacture, Leathersellers' Technical College, London.

We have referred more than once to the part played by gelatine in the preparation of various food products. It is a part sufficiently important to have induced the large gelatine manufacturers in America to carry out, collectively, an extensive campaign of research into the applications and properties of the product, and notable results have been achieved during the past few years, chiefly at the Mellon Institute. These results have been made public; indeed, they have been utilised with great effect by the gelatine manufacturers to promote sales—a policy which affords but one instance of the extraordinary value of co-operative advertising, to which we have also referred on several occasions. In this country a good deal of private work has no doubt been done on gelatine, but surprisingly little has been published, a circumstance which is to the detriment of both producer and consumer. The series of articles we print below should do something to break up the ground.

PART I.—USES OF GELATINE



IT IS surprising how many applications gelatine has in the foodstuffs industries, in photography and photo-lithography, pharmacy, and medicine.

The most important uses of gelatine are in dietetics, when it is utilised to replace meat proteins; add to the density of jams, jellies, and preserves; assist in the setting and solidification of ice-cream, and act as a protective colloid and emulsifying agent in milk, confectionery flavours, mayonnaise dressings, etc.

Meat Extracts

Meat extracts contain from 0·25 to 5·50 per cent. gelatine. Rideal found in three well-known "Invalid Jellies" the following amounts of gelatine: 5·15 per cent.; 5·48 per cent.; 4·11 per cent.

Most prepared or desiccated soups contain appreciable quantities of gelatine, while the well-known "Juvis tablets" are composed of meat, gelatine, and a mixture of vegetables.

Really good meat extracts are used to a very large extent in hospitals and other institutions. The chief value of these preparations lies in the fact that the nourishment obtained by their assimilation is great in proportion to the exertion required from the digestive organs. They are not infrequently given before operations, especially abdominal, the *raison d'être* being easy absorption and maintenance of the vital processes while leaving little waste.

It should be remembered that although gelatine can be used to replace certain "fixed" proportions of meat proteins in commercial meat extracts, it cannot be regarded as a true food—*i.e.*, complete protein food. J. Murlin (*Am. J. Physiol.*, 20, 1907, 234) found that protein nitrogen might be replaced by gelatine up to half of the starvation requirement, while as much as two-thirds might be replaced, provided carbohydrates are present in sufficient amounts as to provide three-fifths of the calorific requirements. The reason why gelatine cannot be regarded as equivalent to meat proteins is because it is deficient in three amino acids: tyrosine, cystine, and tryptophane. Although gelatine cannot be regarded as a true food, it should not be supposed that its inclusion in food products is to be condemned. It is a useful food, a preserver of nitrogen, and is easily digested.

Confectionery

Gelatine finds a ready use as a thickener in jellies, jams, fruit preserves, etc. The following analyses show the relative amounts of gelatine in two samples of cherry jelly:

	Total Solids.	*Ash.*	*Acids.*	*Protein.*	*Reducing Sugar.*
Cherry Jelly (*a*) ...	61·60	60·0	—	1·100	59·80
,, ,, (*b*) ...	79·00	70·0	—	1·200	77·20

(Atwater and Bryant, Bulletin 28, U.S. Department of Agriculture): "Protein may be said to be representative of gelatine present."

The presence of a small quantity of dextrin, tragacanth, gelatine, or the pectin bodies of the fruit juices are necessary in order to give the jam or preserve a certain body. In many instances, however, gelatine is added to conceal the inferior qualities of the fruit used during the manufacture. Chocolate and cocoa are sometimes treated with gelatine in order to give these substances the required density. It is interesting to note that the presence of any thickening substance in cream, such as sucrate of lime, gelatine, and starch paste, is forbidden under the Public Health (Preservatives in Food) Regulations.

A small quantity of gelatine is sometimes used in the preparation of patent children's foods. Hutchison in his "Composition of Patent Foods" gives the constitution of a large number of products, in which the protein matter (mostly vegetable) varies considerably—fluctuating in some cases from 4 to 14 per cent.

In the manufacture of sweets, such as gums, Turkish delight, etc., gelatine is employed to give the requisite body of stiffness.

Ice-Cream

Gelatine is extensively used, both in this country and America, in the manufacture of ice-cream. Bogue states that upwards of 250,000,000 gallons of ice-cream are consumed annually in U.S.A., and that one pound of gelatine is used with every 500 gallons of ice-cream, so that 5,000,000 pounds find their way into this delicacy every year.

There are many advantages and disadvantages attached to the use of gelatine in ice-cream. Dealing with the former, it may be said that gelatine can produce a jelly at very low temperatures, and also prevent the sugars from crystallising out. Another important advantage in using gelatine in ice-cream, is that it acts, like all emulsoids, as an emulsifying agent in preventing the milk fat emulsion from separating into its constituents. When 0·25 per cent. gelatine is used in the cream, appearance and keeping qualities are enhanced materially. Thus it has a firmness and evenness of texture, which renders it of great use in sundaes and other preparations.

This ice-cream can keep in excellent condition at a higher temperature than the ordinary variety, maximum being 26° F. for the gelatine-containing cream, and about 22° F. for cream without gelatine. If a larger quantity than 0·25 per cent. is used, then the flavour is destroyed owing to the absorbing property of the gelatine. Ice-cream blocks contain gelatine in appreciable quantities.

One of the chief objections to the use of gelatine in ice-cream is that it masks the age and inferior quality. Thus a cream could be sold as fresh which had perhaps been made a week. Bogue (*Chemistry and Technology of Gelatine and Glue*),* in discussing this possible abuse, writes: "... if no gelatine were added to the cream, it would have become unsaleable, and perhaps return to the manufacturer, refrozen with fresh stock and resold. It seems that a constant repetition of the latter procedure would surely be more harmful than the former."

* Published by the Mellon Institute.

Emulsions

Emulsion flavours, salad dressings, etc., all contain gelatine as an essential ingredient. The action of the gelatine in these instances is to act as an emulsifying agent. An emulsion may be said to consist of one liquid dispersed in another. Of course, violent shaking will often produce an emulsion, for example, oil and water, but on standing the two separate out. In order to stabilise this emulsion a third substance is added and this generally takes the place of some gum or gelatine. The theory of emulsions occupies a most important niche in Physical Chemistry, and our present knowledge is due in a large degree to the researches of Pickering, Bancroft, and Hatschek.

Use in Milk

Owing to the fact that gelatine is an ideal protective colloid, it is made use of in medicine for preventing the coagulation of milk during digestion. When used in conjunction with lactalbumin, it greatly assists the digestive organs of infants and invalids. A. Jacobi advocated the addition of gelatine to cow's milk for infant feeding as early as 1889. C. Herter (*Infantilism from Chronic Intestinal Infection*) observes that gelatine is of great assistance in severe cases of malnutrition. In these cases the gelatine prevents the milk fat from coalescing and thus helps digestion. It is of interest to note that Miss K. Pearson has found that, in the majority of cases of malnutrition, milk fat cannot be assimilated, and in these instances the curds are separated from the milk by means of rennet and then sieved into water; this curd and water mixture is used instead of milk.

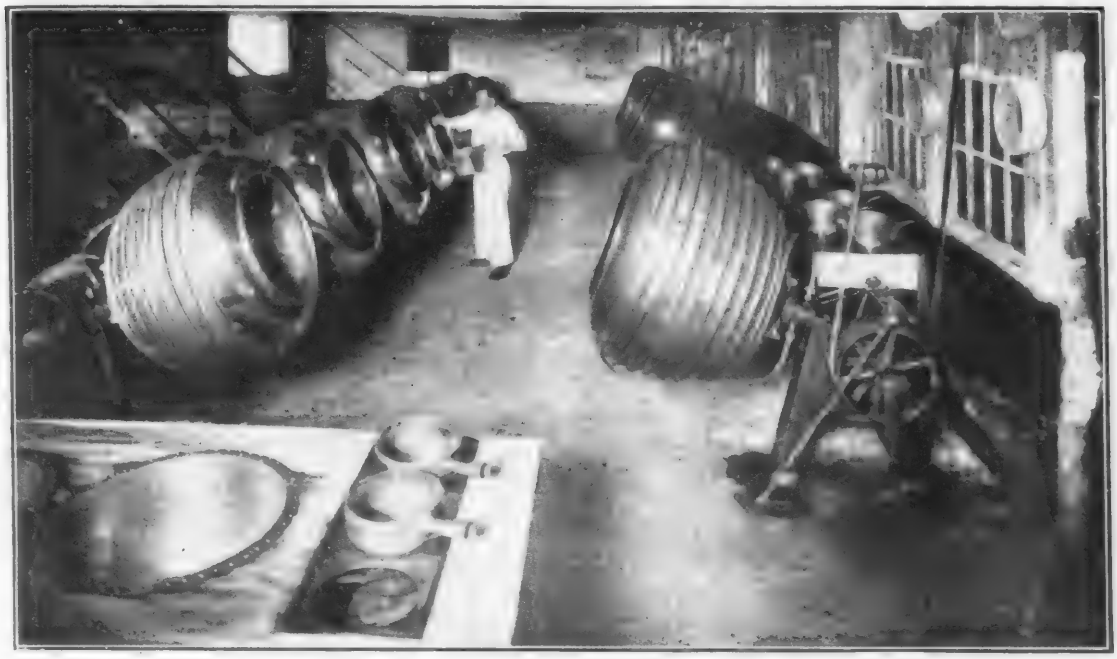
Treatment of Rickets

A gelatine containing extract, made entirely from bones, is sometimes used in treating certain cases of rickets in children. A similar preparation composed of extracted ossein from bones, together with small amounts of inorganic substances, is used in the treatment of dogs suffering from rickets. The authors are given to understand that the above preparation is employed in the kennels of Lady de Courcy Wheeler, the well-known dog-breeder.

(*Continued on page 232.*)

The Alabaster Dragee

The following is a summary of an interesting article contributed to our American contemporary, The Manufacturing Confectioner, *by Adolph Schildberger, an Austrian manufacturer, who for twelve years was staff-chief of the Einem Company, Moscow. Here, and in Berlin, Prague, and Vienna, the manufacture of dragees was brought to a fine art.*



Coating (left) and Finishing (right) Batteries in a Pan Goods Department. Note portions of the Coating Battery with reference to the Windows.

A BATTERY of three pans is the smallest efficient unit. They should be placed facing a window, and each should be independently driven, the speed for alabaster dragee work being 25 r.p.m. Each pan is equipped with a gas-burner beneath for special work, as, for example, when a rough surface is to be produced. Also, the pans must be provided with well-fitting lids and with removable air-ducts for introducing air at will. The cold process is recommended in preference to the hot process.

To obtain satisfactory translucence, the size of sugar crystal must be suitable for the work in hand, and the finest crystal of granulated sugar is usually employed. The size of the centre determines the size of the crystal to be used: if the centre is small, a small crystal is used, but large centres require a coarser size of "fine granulated."

The following materials are required:

The "Arabol" Solution (adhesive for foundation coating). 6½ lbs. of gum arabic and 4½ lbs. of edible gelatine are dissolved in 25 quarts of warm water and strained through a sieve. 11 lbs. of powdered corn-starch are next stirred in to a smooth paste. The solution must be stirred before using, as the starch settles out.

The Binding Syrup (to serve as adhesive for crystal coats). 53 lbs. of sugar are cooked to 36° Bé. 7 ozs. of cream of tartar are made into a cream by the addition of a small amount of water, and stirred into the sugar syrup. Add 170 lbs. of glucose, mix thoroughly, and allow the entire mixture to cool before using.

The Sugar Syrup (to provide moisture seal before finishing). A good quality of white sugar is cooked with pure water to 221° F. and strained through a cloth before using.

The Process

The centres are placed in the pan, which is then set in motion. Sufficient Arabol solution is poured on the centres to make them moist; then powdered sugar is immediately sprinkled upon them, and they are allowed to roll until a smooth foundation coating has been formed. They are then transferred to wooden trays and are spread out to dry at room temperature. When dry, they are sieved to remove dust, and put back in the rolling pan. A portion of binding syrup is poured on the centres until they become moist again, at which point the fine-crystal sugar is quickly thrown in.

After three or four applications of syrup and dry sugar, the dragees must be removed from the pan to the trays and permitted to dry for an hour or two, or, better still, overnight. Then they are dusted off carefully and put back in the pan for further applications of syrup and sugar. The syrup is poured on until they become uniformly moist, and the crystal sugar immediately thrown in.

When the coating is sufficiently thick, the goods must be run with the cover on until they become perfectly smooth, and then dried out on the trays for two days before attempting to apply the gloss.

Pitfalls

The secret of good dragee work lies in the proper balancing of the binder-syrup and the dry sugar. Too much sugar gives a rough surface; too much syrup causes subsequent sweating of the goods. Centres containing moisture which may come through later must be coated with the sugar syrup (see above) before applying the final gloss. If the dry sugar is thrown into the pan too late, the crust, if it is formed at all, is weak and will be broken, and the goods will be irregular in shape. As soon as it is noticed that the sugar was put in too late, or too much sugar was added, the cover is put on until the centres again run smoothly. Covering the pan will also correct a dusty condition of the goods. If covered too long, the goods will become sticky and lumpy.

Applying the Gloss

The pan must be perfectly clean, and the dragees carefully dusted to remove all dust and "sand." About 100 lbs. of dragees are placed in the pan. A small amount of binding syrup is sprinkled over them and allowed to soak in. The next operation requires delicate timing. At the exact instant that the moisture disappears from the surface, a small amount of wax is applied. This wax is made by melting one part of white beeswax in one part of olive oil and allowing the mixture to cool. About ½ oz. is all that is necessary for the 100 lbs. in the pan, and this is spread through the rolling mass with the hands. Air is next blown into the pan until the dragees are running quietly, and work up a high gloss. Care must be taken to avoid an overdose of wax, or the goods will "slide" and become scratched; an even rolling is necessary. The resulting gloss is not produced by the wax, but by the sugar, the wax being applied to facilitate rolling at this point.

The finished surfaces must be quite dry when the goods are removed from the pan, otherwise they will not hold their gloss.

The flavours are added to the binding syrup. Colours are only applied to the very last coat, being dissolved in the syrup for that coat.

All packing materials should be stored in a warm, dry place, otherwise the goods may sweat and the gloss be ruined.

A conveniently placed Steam-Table in a Pan Goods Department, for mixing the Syrups, Colours, etc., and keeping them at the proper Temperature throughout the work.

(*Continued from page 239.*)

Fermentation and Mould

The final points are "fermentation" and "mould."

A "slack" jam is always liable to these as filled in the ordinary way—*i.e.*, jam cooled in jar and sealed later.

Since the hot jam when it is filled into the jar must be sterile, or as near sterile as is practicable, the infection must take place in the jar. Too low a percentage of sugar is favourable to fermentation especially, and dampness on the surface of the jam, caused by condensation of moisture in the jar between the top of the jam and the parchment cover, is favourable to mould.

With regard to a really satisfactory method of hermetically sealing the filled jars while sterile, there is room for research.

Probably hermetically sealing the jars while the jam is still hot and inverting them for a time to sterilise the side of the jar above the jam and the underside of the cover might be beneficial, but the appearance of the package would lack its usual neatness.

Correspondence

Readers who have difficulties in any branch of food manufacture are invited to address their inquiries to the Editor. The identity of the inquirer will be regarded as strictly confidential. The same applies to readers who desire to supply alternative answers to or comments upon any of the questions or other matter appearing in the JOURNAL, *unless, of course, permission is given by the correspondent to sign or initial them.*

—What causes the grey frosting, sometimes known as bloom, to occur on chocolates, and in what way may it be entirely eliminated?

The usual answer to the first half of the question is that the chocolate was not properly tempered, or was at the wrong temperature when used, or was cooled at the wrong temperature. It is also important to maintain correct dampness or "humidity" of the air. Useful information regarding these points will be found on page 115, Vol. I. of FOOD MANUFACTURE, and on page 229 of the present issue. Pure chocolate, or chocolate made with really good substitute fats, when handled with practical skill, should give little trouble. Any chocolate will bloom when exposed to the direct rays of the sun.

2.—*We are using a preparation of invertase marketed as "Convertit." In some of the centres made from this product there is a distinct flavour resembling petrol. Is there any way to obviate this?*

The odour described comes from toluene. A small quantity of this substance is mixed with the invertase to prevent it from decomposing. As soon as the bottle is allowed to stand, the toluene rises to the surface of the invertase solution and prevents the air from reaching it. The quantity is so slight that if the bottle is well shaken before the contents are used, it requires a particularly discriminating tongue to identify it in the finished goods. It is possible to remove the toluene entirely by straining the Convertit through a fine linen cloth wet with cold water. Only the amount to be immediately used should be strained.

The exact amount to be used should be measured out after the bottle has been well shaken, then this portion should be strained as described and used at once.

3.—*We are making a line of fruit pastilles, and find no difficulty with any but the Black Currant, and these will not stand up. After a very short time the pieces, whether sanded or crystallised, will sweat and lose shape. Can you advise us as to the cause and any possible remedy? Others seem to have no trouble.*

You are not specific as to the type of pastille you are making. There are two causes of softening which may be applicable to your case. As you are having trouble only with the Black Currant, we will disregard all general faults, and consider only these two which commonly affect that flavour.

If you are making a straight fruit pastille and depending on the pectine of the fruit to hold the pieces in shape, or if you are using gum arabic, it is probable that, as the piece is nearly black, you are using up your waste from other batches in it. If this is the case, look well to the waste and be sure there is not too much acid in it. If very acid, it should be melted down separately and added to the batch after the cooking is all done. In this case, the normal glucose content should be lowered in the batch itself.

The use of the actual Black Currant jam or fruit in a gelatine base batch is, of course, impossible. The fruit contains a very considerable quantity of tannin, and this reacts on the gelatine to render it insoluble. The result would be a granular sticky mass, the granules formed of the gelatine.

If a Black Currant pastille made with gelatine is required, it is best made with sugar, neutral invert sugar (to replace the fruit sugar in the jam), glucose, and a true fruit black currant flavour.

4.—*We find that our fondant cream centres are very irregular in the period they require to mature. Some are soft in a few days, some require two weeks, while others never get soft at all. Will you explain this, please?*

The softening of fondant or cream centres is due to the inverting of the sugar, and the redistribution of the moisture. You do not mention what type of process you are using to cause their maturing, but from the fact of the variation, we will assume that you are simply adding acid.

The action of acid on a cold sugar solution is very slight, so the actual breaking down of the centre is due almost entirely to the redistribution of the moisture in the fondant. Slowly in a cool place, slightly faster in a warm, the binder crystals which hold the fondant in a solid mass dissolve in the syrup surrounding these crystals, and the mass becomes soft. The degree of softness is governed by the amount of moisture in the syrup. This is a hazardous and unsatisfactory way to mature cream centres. If there is too much moisture in the syrup, fermentation is nearly sure to result. If too little, the centre will never properly mature, and what result is obtained will take a long time.

The majority of the modern manufacturers depend on invertase and a neutral standard invert sugar to gain the desired degree of softness in a definite space of time. By this process fermentation may also be entirely controlled. Both these products, perfectly standardised, are available on the market. Proper working formulæ are supplied by the makers.

FOOD MANUFACTURE is sent to any address in the World for 10s. per annum. Send your subscription now to LEONARD HILL, LTD., 173, Fleet Street, London, E.C. 4.

Preservatives and Jam

By T. G. JOYCE, B.Sc., F.I.C.

In jam-making, preservative as permitted is useful as an extra precaution when all due care has been exercised in every detail of factory operation, from the receipt of the fresh fruit to its storage for sale in the jar. But without that care and attention to cleanliness (in order to exclude the germs of putrefaction) the amount of preservative is so small as to be of little use. In the past, too much reliance has been placed upon preservatives. Prevention is always better than cure; in any case, the preservatives will not cure damage already done.

MUCH HAS been written and said about the regulations as to preservatives in food, yet to the manufacturer problems are constantly presenting themselves, the solution of which requires much careful thought and consideration.

It may be inferred that the jam manufacturer is not entirely without his troubles.

The Act has been passed and it is for us to accept it in spirit as well as in letter. To know what is intended, some information may be gained by a consideration of the "Final Report of the Departmental Committee on the use of Preservatives and Colouring Matters in Food." There we find the following axiom: "That it is undesirable to add to articles of food any material not of the nature, substance, and quality of food." Their deliberations were concentrated on ascertaining, where such addition is found to be necessary, the minimum amount required, and, where a choice is possible, which is the least undesirable.

Prior to these regulations, the substances most generally in use as preservatives for jam were sulphurous acid, salicylic acid and benzoic acid and their salts—the first two in England and the third in America.

By the regulations, only one preservative substance is permitted—viz., sulphur dioxide (including sulphites)—in the manufacture of jam, as under:

	Sulphur Dioxide not exceeding Parts per Million.
Fruit and fruit-pulp—not dried:	
Cherries	3,000
Strawberries and Raspberries ...	2,000
Other fruit	1,500
Dried fruit:	
Apricots, peaches, nectarines, apples, and pears	2,000
Jam—including marmalade and fruit-jelly prepared in the way in which jam is prepared	40

Thus the preservative is permitted to be added to the fruit or fruit-pulp if made into jam direct, *in order that it may act as a preservative in the finished jam*, or to the fruit or fruit-pulp *in order that it may be stored until it is required to be made into jam.*

It was suggested that where the jam was made from fresh fruit no added preservative was necessary, the sugar alone being sufficient.

With regard to storage of fruit or fruit-pulp it was questionable whether cold storage would be found satisfactory for the fruits concerned, and it was thought that sterilisation was impracticable on the scale demanded.

Hence the recommendations and the regulations.

Sulphur Dioxide

Consequently jam manufacturers are permitted to use sulphur dioxide (SO_2) including sulphites, calculated as SO_2, in not exceeding certain proportions in order to attain certain ends.

The solution of the whole situation lies in a thorough knowledge of the effective strength of the dose permitted.

As a destroyer of micro-organisms sulphur dioxide does not rank high. It is powerless against spores, and with regard to non-sporing forces, to be effective it must be in the proportion of from 1 in 100 to 4 in 100.

On the other hand, before the committee, it was stated "that immersion of the fresh fruit in a dilute aqueous solution of sulphurous acid (containing 8 parts of sulphur dioxide in 10,000 parts of water) in vessels from which air is excluded, is an effective means of preservation" (ref. Final Report Depart. Com.). It was also stated that "excessive quantities of sulphurous acid are sometimes used."

We thus see that we may use sulphur dioxide itself or as any of its compounds, sulphurous acid and sulphites, in quantity so small that of itself it is useless as a preservative. That is to say, useless unless every other conceivable precaution is taken in addition. That appears to be what is intended.

Cleanliness

The science of public health is advancing year by year and the demands of civilisation are becoming more and more exacting.

The duty of the food manufacturer is clear—namely, to comply with the law and to use his knowledge for the benefit of the community. It does not follow that because certain preservatives are allowed in certain proportions, it is necessary to use them

under all conditions. Where they are permitted now, it may be, as knowledge increases, that they will be prohibited altogether, and it is up to the manufacturer, now, to investigate all his processes, and, where possible, so to improve them, that he may be ready to meet any emergency.

Probably the first thing to be studied is the hygienic condition of the factory, in the sense that it is free from anything that is liable to contaminate the fruit or jam.

It must be clean, and though there should be free circulation of air, the air should not be dust laden.

It should be dry and the store-room for fruit should be cool.

The raw materials of jam are fruit and sugar. It is with the former that we are here concerned.

The Fruit

The first operations on the receipt of fruit into a factory are picking and cleaning. The earliest signs of spoilage to jam may occur by the use of decayed or dirty fruit. Overripe fruit should be avoided. The germs of putrefaction, mould, and fermentation should not find the fruit a satisfactory culture medium.

Hence scrupulous care is required at this stage.

Pulping

If the fruit is to be pulped and stored until required, a *sterilising* process is resorted to. This may be accomplished by either heat or cold. Heat, however, is the most practicable. Although all micro-organisms and spores may not be destroyed by boiling, many are, and a higher temperature than that of boiling is unsuitable and impracticable for fruit.

Whatever may be the details of the steriliser used, steam pan, coil, etc., or the working details of amount of water added, the whole quantity of fruit pulp must be well stirred and brought up to the boil for, say, 10 to 15 minutes to insure as complete sterilisation as possible.

It is during this sterilising process, or "pulping" as it is called, that the preservative is added.

Sulphur dioxide, whether as the gas or in solution known as sulphurous acid, is volatile with steam. If one of the salts be used, such as the sulphite or bisulphite of soda or lime, the acid of the fruit acts on it and releases free sulphurous acid.

Hence, the preservative should be added *just before the end* of the heating process and thoroughly stirred in. If added earlier some will be lost.

Pulp Storage

The finished pulp is then run off hot into suitable vessels, generally the 40 gallon casks are found most convenient.

These casks should have been previously rendered sterile by one of the known processes.

The casks when nearly full are rendered air-tight by securely fitting bungs and rolled into position for storage.

During storage they should be prevented from becoming so dry that they leak between the staves or at the ends. They should be kept cool and protected from the direct rays of the sun.

The temperature of the storage-room should never be higher than 70° F.—the lower the better—after the casks of pulp have cooled.

Jam from Fresh Fruit

If the fruit, instead of being pulped and stored, is to be made into jam, the preservative, if required, is added to the jam in the pan, the correct amount being used so as to insure that not more than the permitted quantity remains in the finished jam.

After the jam has been made, either from fresh fruit or fruit-pulp, it is poured from the boiling pans into suitable vessels and filled, either by hand or machinery, into jars.

It is customary to allow them to cool, cover with waxed tissue, and seal with a parchment cover, and store in a cool place.

As the result of the jam manufacturer's labours can be seen only by an examination of the finished article, it may be useful to discuss a few defects occasionally found and to seek for remedies.

Consistency

The first is relative to "consistency." One can assume that each manufacturer has his own ideas about that, and always had, although they may have been modified as time went on. The first attempt to fix a definite standard for all jam was the Jam Prices Order of 1917, followed by those of 1918 and 1920, and finally by the Sale of Food Order of 1921, which was revoked within a few months. The requirement as to consistency there was that the water soluble extract was to be not less than 65 per cent. By "water soluble extract," of course, is meant sugar and all soluble substances present in the fruit and added sugar. This means that the added sugar would be approximately 60 per cent. Incidentally, 60 per cent. of sugar in a jam should be, of itself, sufficient to keep it sound without an added preservative.

Candying

The next point is crystallisation or "candying." This, of course, is due to the presence of more sugar in the jam than it can hold in solution for any length of time. It may be caused either by the jam having been boiled until it was too stiff or to its being too acid.

The question of acidity of a food product is now being considered carefully by manufacturers as they recognise the importance of it.

In many jams liable to candy, a portion of the cane sugar is replaced by glucose, but this is not always effective in preventing it.

(*Continued on page 236.*)

Food Factory Costing

By CHARLES E. SEARLE

PART II

In our first article we dealt chiefly with the organisation of the factory necessary to a costing system, giving particulars of Stock Rooms, etc. We would remind readers that the scope of these articles goes somewhat beyond actual costing, the costing office in this case being designed also to deal with records and statistics. Hence some of the particulars given may be deemed to have more bearing on the work of the Departmental Managers. In this article we propose to deal somewhat more fully with the work inside the costing office.

Overhead Charges

IN CONSIDERING the question as to what shall be considered oncosts, overhead charges, etc., and what shall be considered "direct charges" on the department or on manufactured lines, no hard and fast rule can be laid down; this must be largely a matter to be decided by individual firms. Generally speaking, however, all charges that can be made "direct charges" should be so made, otherwise some articles will have to carry an unfair proportion of these charges and may be ruled out as non-paying lines.

Many businesses, however, carry a certain proportion of non-paying lines, because they are an integral part of the business or because their sale helps the sale of more profitable lines.

One firm of accountants recommended that not only the depreciation of the building itself but that heat, light, rates, taxes, repairs, and maintenance of plant, etc., even to the extent of subdividing Sales Offices from General Offices and Costing and Advertising Offices, should all be charged against the departments concerned according to the actual floor space occupied.

This is carrying matters rather far, and, as stated, many of the decisions as to what shall be considered overhead charges can only be left to the discretion of the accountants of the firms concerned.

Stores Ledger

We will now turn our attention to the stores ledger, which is usually headed somewhat as follows: Article..... Sheet No..... Bin No..... On the receipts side we have: Date received, Invoice No., Order No., Suppliers, Quantity, Weight, or No., Rate and Amount. On the issues side we have: Date, Dept. receiving, Requisition No., Quantity, Weight, or No., Rate and Amount.

This ledger carries information rather farther than the bin-cards and is prepared on the issues side from the requisition forms from the various departments and on the receipts side from the actual goods inwards invoices, and it also forms a very efficient check on the bin-cards. It may be found that taking first and last stocks into account the receipts and issues do not balance; this gives us seriously to thought and many leakages not otherwise suspected come to light.

Are we receiving correct quantities from our suppliers? Are our glass breakages excessive? Is our store-keeper sufficiently accurate in measuring out weights and quantities? We may even find that our petrol pump is not in order. All these leakages from various sources (and it is surprising how many there can be) keep us from making the profit on our goods which we feel we are entitled to expect.

In the stores ledger we have our first important link with the work of the general offices, no invoice being accepted by the general office until it has received the official stamp of the costing office, and consequently no goods can be obtained or paid for without the knowledge of the costing office.

The stores ledger itself is of great value as it gives particulars of when goods were received, from whom, and cost of same without it being necessary to turn up perhaps a considerable number of accounts in the general office.

Departmental Costing

Now for a moment we will turn our attention to the question of departmental costing. The first thing to be considered is, What are our departments? Without interfering with our general business system, what is the minimum number of departments we wish to cost?

Certainly each manufacturing department will be separate and distinct; what about inwards stores and manufactured stores, or say our engineering staff and motor mechanics, or even our sales and our costing office? All these are separate departments, and it is desirable to know the cost of each. On the other hand, we can carry this to such an excess as finally to come to the conclusion that each employee is a department on his own. Still, to revert to serious matters, we shall need to limit our departments (on paper) somewhat considerably and bulk several together for costing purposes. This again is a question for individual consideration. Having decided this and agreed, say, to twelve (more or less) departments, we introduced into our stores ledger a sufficient number of money columns on the issues side and put the value of goods issued under the head of the department concerned, carrying totals of these forward weekly or monthly into our departmental costing book.

When we come to costing individual articles within one department or spread over several departments, the article is given a code letter or number. This number is placed on the requisitions; it appears in a

further column against each department column in the stores ledger, and is abstracted from that to a further manufactured articles costing book.

Into these departmental and manufactured article cost books other items gradually come in. Our weekly return of wages, our goods transferred from one department to another for various purposes, and returned goods, become a cost on the department and then a cost on the individual article; various other charges which we will consider later will also appear.

Labour

The question of labour then comes up for consideration. The principal of each department is supplied with a time sheet on which the names and gate number of each employee is recorded, and the time spent in the department supplied with this is a simple matter and needs no further comment. However, in factories where labour is not transferred from one department to another, a time recording clock is introduced. When, however, it is desirable to cost individual articles, each employee has a daily time card filled in either by the departmental clerk or foreman, giving the time spent on each article manufactured. To take the case of tongues, for example, with a code number TU. Certain time spent on TU will come from various departments of the firm—e.g., the brining department, the labelling department, the bottle-washing department, perhaps the sterilising department, quite apart from the time spent in actually cooking the tongues and packing into tins and glasses. Here again we may find that some outside department, so to speak, is eating away all our profit.

We shall probably come to the conclusion that it is a good paying proposition for all possible processes for one individual line to be carried out in one department under one foreman, but this depends largely on the floor space available.

Other Considerations

If we have carried out the ideas suggested in these articles so far, we have done a considerable amount of work. We have probably not had to engage a store-keeper, but have had to introduce a costing clerk, and if he has had all the support he should have had and is a tactful man able to extract information without causing offence, he should be in a position to supply, say at the end of three months, some useful and reliable information. A very careful stock will then be taken, the bin-cards and stock ledgers checked against actual stock and a definite start will be made.

However we must not assume that we are at the end of the matter. There are several factors yet to be taken into account.

Some of the information required may be in the hands of the company secretary, some in the hands of the chief engineer, or the sales or advertising manager, and their co-operation will become necessary. To arrive at actual costs we shall need information on the following subjects at least: Selling expenses, fluctuating and standing charges, travellers' salaries, commission and expenses; possibly our despatch department, motor deliveries, petrol, oil, and packing cases come under this heading, and, we may add, steam, gas, building depreciation, machinery depreciation, and perhaps rent.

Some firms charge their departments with rent to meet the cost of various standing charges.

We shall also have charges for interest on overdraft at bank, if any, and the employment of outside firms in such matters as factory-chimney repairs, management expenses, directors' fees, office salaries, printing and stationery, various insurances, and advertising charges—whether advertising simply to keep the name of the firm before the public or to push certain special lines. We may have our own laundry and canteen; in fact, every expenditure, whether direct or in the form of depreciation, must be taken into account.

Carriage on goods inwards is often charged on the invoice, at other times forward carriage appears as a separate item in our books, but in both cases it has to be considered part of the invoice value, especially as it may at times be cheaper to buy certain articles locally at a higher rate than to buy them elsewhere and lose money on carriage.

It is obvious that many of these charges can only be obtained at the end of an accounting period, and if any costings are required at other times, figures and percentages can only be "intelligent anticipation" based on previous records.

Many of the charges here mentioned and others peculiar to individual firms are obtainable from the records kept in other departments. Probably the secretary will supply the costing department with certain inclusive figures for directors' fees, office salaries, etc. The sales manager will have reliable figures from his department as to what the selling staff costs the firm, and the advertising manager will have his own quota to add to the necessary information, but it may not be out of place at this point to give what little information is at our disposal under these headings.

It will, or may, be thought that some of these items which are obviously overhead are not strictly the business of costing, but we think it will be admitted that no single jar of jam or bottle of pickles can escape paying its share, and if the buyer of the necessary ingredients is not to be unfairly blamed, or labour is not to be made the victim of a sudden burst of economy, then we must be sure that these overhead costs are not more than the manufactured articles can stand, and our economy may have to start not at the labour end of the proposition, but in the directorate. Not only the coal industry but the food industry may need to take note of the words of Lord Beaverbrook:

"By the dismissal of all redundant directors, many of whom are quite useless, play no part in the conduct of the industry, and simply draw fees for services of no value."

Machinery Register

Now to return to some of these overhead charges. One of the interesting records we shall need to keep is the machinery and plant register, a book that may give us some little trouble to compile, but when once done requires very little attention. This book will re-

(*Continued on next page.*)

Use of Chemical Food Preservatives in Germany

THERE ARE no special regulations specifically defining chemical preservatives admissible in foodstuffs in Germany, according to a report of November 1, 1927, from American Trade Commissioner Walter F. Daugherty at Berlin. There is a general provision for penalties for the misuse of harmful food preservatives and the harmful adulteration of foodstuffs. The provision excludes special regulations pertaining to wines and other fruit and malt extracts containing alcohol and to preservatives entering meats and fats. This practice of generalisation may soon be changed by the issuance of regulations supplementary to the new foodstuffs law, effective October 1, 1927, outlining permissible food preservatives in several countries. So far, Germany has attempted to issue general rules, specifying kinds and amounts of preservatives in individual cases. Preservers are therefore enjoined to follow these specifications in order to avoid possible legal difficulty.

Admissible kinds and quantities of foodstuffs, preservatives, and their application are detailed in the following list:

Article of Food.	Preservative.	Maximum allowed per 100 Grams of Article of Food.	Statement of Preservative Content.
1. Meat salad	Benzoic acid	0·125 gram	No
2. Fish preserves (anchovy, sild)	Boric acid	0·5 ,,	Yes
3. Caviar	Hexamethylentetramin	0·1 ,,	Yes
4. Crabs, fresh	Boric acid	0·9 ,,	Yes
Crab preserves		0·75 (0·9) gram	
5. Preserved eggs, yolk for exclusive consumption in bakeries or for manufacture of macaroni	Boric acid	1·5 gram	No
Yolk	Benzoic acid	1·0 ,,	No
6. Edible fats, margarine	Benzoic acid	0·2 ,,	No
7. Mayonnaise	Benzoic acid	0·25 ,,	No
8. Grits and groats	Sulphurous acid	0·04 ,,	No
9. Preserved fruit, dried fruit	Sulphurous acid	0·125 ,,	No
Fruit juice	Benzoic acid	0·15 ,,	No
Fruit juice	Formic acid	0·25 ,,	No
Fruit pulp	Benzoic acid	0·15 ,,	No
Fruit pulp	Formic acid	0·25 ,,	No
10. Wine	Sulphurous acid in gaseous form or its solution in distilled water and technically pure potassium metasulphite containing at least 5 per cent. SO_2	Provided that only small quantities of sulphuric acid are contained in the beverage	No
11. Imported wine	Sulphurous acid in gaseous form or its solution in distilled water and technically pure potassium metasulphite containing at least 5 per cent. SO_2	According to the regulations provided for the sale in the countries of origin	No
12. Edible gelatine	Sulphurous acid	0·125 gram	No

Food Prices

In the following table the average prices in November are compared with those of October and of a year earlier:

Groups.	No. of Items.	Increase (+) or decrease (−) per cent. compared with Oct., 1927.	Nov., 1926.
I. Cereals	17	− 2·4	− 2·8
II. Meat and Fish.. ..	17	+ 0·1	− 9·6
III. Other Foods	19	+ 1·1	+ 3·4
Total Food ..	53	− 0·3	− 3·0

(*Continued from previous page.*)

quire a certain number of headings, somewhat as follows: Number of machine, suppliers, description, original cost, carriage and installation, total cost, date, before written down, date, written down to. We may also like to add in the same book cost of repairs, department using machine, and other information, but the depreciation will be the matter that chiefly concerns the costing department. A record of this description giving the life history of our motor-cars is invaluable, and may lead us to the conclusion that in this direction our cheapest method is to buy an inexpensive car and sell it, say every three years, before it begins to eat up money in repairs.

Sales Department

The selling side of our business is often one of our most costly propositions, and in selling we refer to the whole selling organisation, which in some firms comes under the sales manager.

In a large factory, when the goods have been manufactured, stored, labelled, and passed as sound, they often leave the control of the works manager and go into the order assembly room before going to the despatch and packing department, and in the assembly room, until they are delivered to the customer, they are under the control of the sales manager.

(*To be continued.*)

British Confectioners

THE FOLLOWING interesting comments are taken from an article entitled "British Candy Manufacturers," recently contributed to the American *Confectioners' Journal* by E. Conner, of London. This gives further support to the policy adopted by FOOD MANUFACTURE.

It cannot be denied that there are many things that could be done to improve still further the confectionery trade and assist the praiseworthy efforts of its representatives. Thousands of manufacturing and other confectioners are eager to acquire greater trade knowledge, supplementary and useful information about the raw materials and the finished products of their manufacturers. These are precisely the individuals who should be provided with greater facilities to conduct research work. Reading about such things is all very well, but science needs to be explained and reduced to its simplest interpretation if all are to benefit by it. Some manufacturing confectioners are capable of grasping facts quicker than others. Assistance is needed so that all interested in the problems shall equally understand.

The writer frequently comes across numerous confectioners and confectioners' assistants whose whole heart and soul is in their work, who are incessantly trying their utmost to go forward. In addition to reading trade publications and technical books relating to their profession, they endeavour to attend evening classes and lectures. It is a veritable pleasure to assist all such persevering confectioners—indifferent representatives of the trade are best ignored. These "bookworms" read mechanically as it were, the writer discovered. To say that they thoroughly understand all they read about, or hear, would be erroneous. They have a good general knowledge of their work, but when it comes to the more complicated, scientific portions they are often "stranded," as they say. This is a very great pity indeed, and proves once more that something is seriously lacking in the way of more *easy*, practical up-to-date knowledge. It does not follow that what lawyers, chemists, and scientists understand is equally understood by others. There is ample room for revision of trade knowledge; as soon as important discoveries are made, new practical methods adopted and devised, these should, as soon as possible, be "translated" into the very simplest of technical language—thus giving all confectioners the same chances of success.

The more we look at confectionery the more we feel fully convinced that it can be vastly improved in many respects. We are a long way from having discovered all the hidden, mysterious secrets of confectionery. That being so, it is most imperative to call upon science and art, if unknown confectionery treasures are to be revealed to us. The more we fall back upon experiments the more we shall add to our store of knowledge. These so-called "mysterious secrets" are known to exist, they only need to be unfolded—as do leaves and blossoms out of their buds under proper influences.

Granted experiments are costly, but they are most essential. They should be continued in the interest of cultivated, experienced, intelligent manufacturing confectioners who are genuinely anxious to learn and willing to be taught.

Correspondence

December 14, 1927.

To the Editor.

DEAR SIR,

With regard to Dr. Bigelow's letter quoted in the Editorial of your December number, I should like to point out that although in the canning of some foods, the vitamins are apparently not affected, there is ample evidence that this is by no means always the case. In "Vitamins in Canned Foods" (written by Dr. E. F. Kohman and published by the National Canners' Association Research Laboratory) we read, for instance, that during the canning of artichokes 50 per cent. of the vitamin B was lost and that canned pineapple is only two-thirds as rich in vitamin C as fresh pineapple, and so on. It is therefore clear that canners have not yet completely solved the problems of canning foodstuffs without the destruction of vitamins.

Yours truly,
E. H. CALLOW.

Calcium Biphosphate: Forthcoming Hearing

THERE will be a Hearing on Tuesday, January 17, of the complaint which the Board of Trade have received under Section 1 (5) of the Safeguarding of Industries Act, 1921, that calcium biphosphate (baking powder quality) has been improperly excluded from the list H ii of articles chargeable with duty under Part I of that Act as amended by Section 10 of the Finance Act, 1926.

The Hearing will take place at 11 a.m. in the Main Conference Room, Board of Trade, Great George Street, London, S.W.1, and the tribunal will consist of Mr. A. A. Hudson, K.C., the Referee, Professor F. G. Donnan, C.B.E., F.R.S., and Professor J. F. Thorpe, C.B.E., F.R.S., who have been selected by the Lord Chancellor for the purpose of this arbitration from the panel constituted under Section 10 (4) of the Act of 1926.

Chlorophyll Pigments

ALTHOUGH REFERENCES have been made from time to time to the possible use of chlorophyll as a green colouring material for foodstuffs, nothing appears to have been published on the subject, and information has been kept closely guarded.

The short contribution made by F. M. Schertz of the Soil-Fertility Investigations, Bureau of Plant Industry, Washington, to the October issue of *Industrial and Engineering Chemistry*, is therefore of special interest.

Chlorophyll is the green pigment as found in living green plants. The chlorophyll of commerce is probably all obtained from nettle leaves, but it is not usually the natural product as directly derived from plants. Natural chlorophyll contains magnesium and is not very stable. Much more important, commercially, is the copper-containing product derived from natural chlorophyll, and known as copper pheophytin; it is a beautiful green compound, and relatively quite stable, retaining its brilliant green colour even when exposed to light. This copper pheophytin is the chlorophyll of commerce.

Apparently, America has not yet engaged in the preparation of chlorophyll products. They have been imported for many years. Several samples have been analysed and found to contain copper. However, a few samples marked "pure chlorophyll," and selling at a high price, probably do not contain copper. In 1924 the U.S.A. imports of commercial "chlorophyll" amounted to 3,213 pounds, valued at $5,799.

In foods it is used to hide colour and bleach cotton-seed oil, olive oil, and other seed oils. It is also used as a colouring in various food products, although in Schertz's opinion the amount so used is quite limited. Other applications are for colouring candles, leather, cosmetics, and soaps. Undoubtedly, copper pheophytin will find a much wider use in pharmaceutical preparations when its merits are better known and also when a reliable product is prepared.

Water, alcohol, and oil soluble products are being sold for colouring purposes. The stability of the copper compound has been tested by Schertz in various oils, and at the end of two years all the samples retained their bright green colour. It may be easily and quite cheaply prepared, and has possibilities of being much more widely used than it is at the present time.

Fish Splitting and Skinning

PROMINENT announcements in the local Press state that a Halifax firm, the National Fish Company, has lately installed mechanical appliances for the splitting, skinning, and other methods of preparing the fish immediately after they are caught (according to a report of October 5, from American Consul Erik W. Magnuson, Halifax, Nova Scotia). The manager of the National Fish Company is of the opinion that if the new methods were adopted by the Lunenburg fishing fleet, the Nova Scotia fishing industry would be greatly assisted in its competition in the markets of the world. The efficiency and the advantages of the new machinery to the industry were recently demonstrated at the National fish plant.

The machine, a German invention, splits, heads, and skins fish with great rapidity and perfect accuracy and finish. The National Fish Company has recently installed three of them in their plant, and arranged a public demonstration, to which were invited representatives of the fishing industry of Lunenburg, and of Gloucester, Mass., and other fishing centres along the Atlantic seaboard of both Canada and the United States.

Trade News

DUBUIS & ROWSELL, Essence Manufacturers, have transferred their premises from Southwark to:

Duroma Works,
Elmwood Road,
Croydon,

and their telegraphic address is "Duroma, Croydon," and their telephone No. Thornton Heath 2611.

ON December the 21st, FOOD MANUFACTURE received the following telegram: "Our thermometer broken. Please ask Cambridge Co. supply instrument as illustrated August, page 91; complete face and bottom guards. Unable to find their address. Most urgent; oblige, *Jam.*" This request was, of course, dealt with promptly, and the instrument was despatched by the Cambridge Instrument Co., Ltd., to our client a few hours later.

Census of Fish-Curing Trade

The following particulars, extracted from the "Board of Trade Journal," are given by the Third Census of Production (1924), Preliminary Reports, No. 25.

THE FOLLOWING statement gives particulars of the output of all fish-curing establishments in Great Britain that furnished Returns to the Census Office in respect of the years 1924 and 1907:

Products.	1924.		1907.	
	Quantity.	Selling Value.	Quantity.	Selling Value.
	Cwts.	£		£
Fish Cured, Smoked or Salted:				
Herrings ...	6,020,000	5,012,000	Cwts. 810,000 Barrels. 2,091,000	420,000 2,183,000
Pilchards ...	56,000	74,000	Cwts. 10,000 Hogsheads 11,000	8,000 30,000
Haddocks ...	511,000	1,309,000	938,000	716,000
Cod and Codlings	531,000	933,000	380,000	290,000
Other Sorts ...	356,000	523,000		
Fish Cured, etc., not separately distinguished	114,000	292,000	—	—
Other Products ...	—	82,000	—	11,000
Total Value ...	—	8,225,000	—	3,667,000

The production of tinned fish and fish pastes is not covered by the above figures, being included with that of other tinned or canned products in the report on the Preserved Meat, Fish, etc., Trades (Preliminary Report No. 17, *Board of Trade Journal*, July 7, 1927).

The larger firms engaged in the herring-curing trade generally maintain establishments at several fishing stations on the East Coast of England and Scotland, transferring their curing staff from one station to another for the short period of the fishing season at each station. It is probable that the output of practically all these firms is covered by the above statement, both for 1924 and for 1907. Many firms, however, carry on business at one fishing station only and, in the smaller cases, the curing establishment may be unoccupied except for the few weeks in the year during which the season continues. The figures given above for 1924 fall short of the aggregate production by the amount of the output of many of these smaller firms, who have failed to furnish returns to the Census Office. There are no means of estimating the precise extent of the production omitted from this cause, but it is improbable that the deficiency in the particulars recorded for 1924 is substantially greater than in those relating to 1907.

In calculating the production of the herring-curing industry the option given to firms by the Census of Production Act to furnish Returns in respect of a period of twelve months other than the calendar year is a factor of special importance, owing to the fluctuations that are liable to occur, in successive years, in the quantities of fish landed and available for curing. According to the Statistical Tables published by the Fishery Board for Scotland for the year 1925, the quantity of herrings landed in Scotland by British vessels in the first three months of that year was 344,000 cwts. compared with 904,000 cwts. in the first three months of 1924, and, in the first six months of 1925, 795,000 cwts. as against 2,178,000 cwts. in the corresponding period of 1924. In the returns made by a comparatively large number of fish-curing establishments in Scotland the production recorded covered a period which included the curing seasons of the earlier months of 1925, in which, as the above figures show, the quantity of herrings landed was very substantially less than in the corresponding period of 1924. For this further reason, therefore, the particulars given in the foregoing statement in respect of cured herrings should be regarded as under-stating the total production during the calendar year 1924, and cannot properly be related to the export trade in cured herrings for that year (see below).

The output of the fish-curing trade is, of course, mainly dependent, both as to the kind of fish cured and the total amount of cured fish produced, on the quantities of fish landed and available for curing, and in view of the great fluctuations that occur from year to year in the latter, a comparison between the output in 1924 and in 1907 is only of somewhat limited value. As will be observed, the output of cured haddocks in 1924 was considerably lower than in 1907; as regards herrings, it is understood, from information received from the trade, that the net weight of a barrel of fish (*i.e.*, excluding the weight of the barrel) is 324 lbs., and on this basis the total weight of cured herrings produced in 1907 amounted to 6,859,000 cwts., which also represents an excess over the figure for 1924. On the other hand, the output of other sorts of fish (mainly cod) cured in 1924 was probably greater in the year 1924 than in the earlier year.

Exports and Imports

The quantities and values of Cured and Salted Fish exported from and imported into the United Kingdom during the year 1924 were as follows:

Kind of Fish.	Exports.		Net Imports.	
	Quantity.	Value.	Quantity.	Value.
Cured or Salted (not canned):	Cwts.	£	Cwts.	£
Herrings ...	6,390,000	5,634,000	66,000	53,000
Cod	404,000	957,000	144,000	197,000
Haddocks ...	27,000	70,000	1,000	1,000
Other Sorts ...	208,000	332,000	127,000	213,000

Net Output

The net output of the factories and workshops covered by the foregoing statement was £1,801,000 in the year 1924, that sum representing the amount by which the total value of the output (£8,225,000) exceeded the cost of materials purchased and used (£6,424,000). The net output per head of persons employed in 1924 was £185, and in 1907 £30. In connection with the low figure recorded for the year 1907 it is necessary to take into account the fact that the number of persons recorded as ordinarily employed in that year was probably considerably overstated owing to the inclusion of the same persons in more than one Return (see below).

Persons Employed

The average number of persons employed during the year 1924 at the factories and workshops to which the foregoing statement of output relates was 9,714, of whom 8,615 were recorded as operatives and 1,099 as management, clerical, and technical staff. In the year 1907 the number of persons employed was returned as 24,668, of whom 23,914 were wage-earners and 754 were salaried persons.

The age and sex distribution in the two years was as follows:

Ages.	1924.			1907.		
	Males.	Females.	Total.	Males.	Females.	Total.
Under 18 yrs.	352	236	588	619	471	1,090
Over 18 yrs.	4,234	4,892	9,126	6,017	17,561	23,578
Total ..	4,586	5,128	9,714	6,636	18,032	24,668

In the fish-curing trade it is the practice of persons engaged in the various curing processes (*e.g.*, gutters, packers, etc.) to move from one curing station to another for the period of the herring fishing season at each station. In the Census of 1924 all firms were required to state the total numbers of male and of female operative staff employed by them on a specified day of each month in the year, and the employment figures given above for that year, which represent the average of those twelve monthly statements, are accordingly free from duplication. In the Census of 1907, however, the majority of firms in the trade (*i.e.*, all firms who were not users of mechanical power) were only required to state the number of persons "ordinarily employed" by them in the year, no definite period of the year being specified. Operatives who were employed at different curing stations during the year were accordingly recorded in more than one Return, and the Census figures for 1907 contained a considerable amount of duplication due to this circumstance. It was estimated that in the year 1907 about 8,000 persons from Scotland took part in the English and Irish fish-curing seasons.

The monthly variation in the numbers of operatives at work during the year 1924 is shown in the following table:

Week ended:		Week ended:	
January 12th ...	5,813	July 19th	11,779
February 16th ...	5,876	August 16th ...	11,893
March 15th ...	6,104	September 13th ...	7,883
April 12th	5,826	October 18th ...	12,022
May 17th	6,483	November 15th ...	11,854
June 21st	11,277	December 13th ...	6,575

Power

The total capacity of engines at the factories to which the above statement of production in 1924 relates was shown as 555 horse-power, of which only 3 per cent. was in reserve or idle during the year. The capacity returned in 1907 amounted to 177 horse-power. The capacity of electric motors at factories was not ascertained in 1907, but the quantity of electricity purchased in that year for power and lighting purposes was recorded as 4,000 Board of Trade units. In 1924 motors aggregating 893 horse-power, driven by purchased electricity, were recorded. Nearly 12 per cent. of the capacity of these motors was shown as in reserve or idle during the year.

The main kinds of engine power at factories in the two years were as follows:

Kind of Engines.	1924.	1907.
	Horse-power.	Horse-power.
Steam Engines, Reciprocating	147	93
Internal Combustion Engines...	408	84
Total	555	177

The total capacity of Electric Generators at factories in Great Britain in 1924 was returned as 5 kilowatts. No Electric Generators were recorded by factories in respect of the year 1907.

There were also returned for the year 1924 electric motors of a total capacity of 22 horse-power, driven by electricity generated by engines at the factories, all of which were recorded as being in use during the year.

Commercial and Legal News

(The Editor does not accept responsibility for any errors which may occur in the following notices.)

London Gazette Information

oluntary Liquidations.

(Note.—Voluntary liquidations may, in some instances, refer to companies in course of reconstruction.)

ORNVILLE CEREALS (1926) LTD. Resolved, November 17th, that the company be wound up voluntarily, and that Mr. S. R. Worley, C.A., 23, Rush Lane, Cannon Street, E.C., be appointed liquidator. Meeting of creditors at liquidator's office on December 2nd, 1927, at 2.30 p.m.

MARANGU COFFEE ESTATES, LTD. Resolved, December 14th, that the company be wound up voluntarily, and that Mr. E. Chetter, I.A., 26, North John Street, Liverpool, be appointed liquidator. Claims to liquidator by February 28th, 1928.

Meetings to Hear Liquidators' Reports.

(Note.—Voluntary liquidations may, in some instances, refer to companies in course of reconstruction.)

ELECTRICAKES, LTD. General Meeting of Members of this company at 19, Eastcheap, E.C., on January 18th, at 4.30 p.m. Liquidator, W. H. Cork.

SPILLERS & BAKERS, LTD. (in voluntary liquidation). General Meeting of Members of this company at 40, St. Mary Axe, E.C.3, on January 17th, at 2.30 p.m. Liquidator, E. Phillips.

THE CARDIFF AND CHANNEL MILLS, LTD. (in voluntary liquidation). General Meeting of Members of this company at 40, St. Mary Axe, E.C., on January 17th, at 2.50 p.m. Liquidator, E. Phillips.

SPILLERS VICTORIA FOODS, LTD. (in voluntary liquidation). General Meeting of Members of this company at 40, St. Mary Axe, E.C., on January 17th, at 3 p.m. Liquidator, E. Phillips.

UVECO CEREALS, LTD. (in voluntary liquidation). General Meeting of Members of this company at 40, St. Mary Axe, E.C., on January 17th, at 3.5 p.m. Liquidator, E. Phillips.

THE TUROG BROWN FLOUR CO., LTD. (in voluntary liquidation). General Meeting of Members of this company at 40, St. Mary Axe, E.C.3, on January 17th, at 3.10 p.m. Liquidator, E. Phillips.

SPILLERS NEPHEWS, LTD. (in voluntary liquidation). General Meeting of Members of this company at 40, St. Mary Axe, E.C., on January 17th, at 3.15 p.m. Liquidator, E. Phillips.

JOHN JACKSON & SON, LTD. (in voluntary liquidation). General Meeting of Members of this company at 40, St. Mary Axe, E.C., on January 17th, at 2.40 p.m. Liquidator, E. Phillips.

F. A. FROST & SONS, LTD. (in voluntary liquidation). General Meeting of Members of this company at 40, St. Mary Axe, E.C., on January 17th, at 2.45 p.m. Liquidator, E. Phillips.

THE NO. 1 MILLING GROUP IMPORT AGENCY, LTD. (in voluntary liquidation). General Meeting of Members of this company at 40, St. Mary Axe, E.C., on January 17th, at 3.25 p.m. Liquidator, E. Phillips.

SPILLERS GRAIN CO., LTD. (in voluntary liquidation). General Meeting of Members of this company will be held at 40, St. Mary Axe, E.C., on January 17th, at 3.35 p.m. Liquidator, E. Phillips.

SPILLERS STEAMSHIP CO., LTD. (in voluntary liquidation). General Meeting of Members of this company at 40, St. Mary Axe, E.C., on January 17th, at 3.20 p.m. Liquidator, E. Phillips.

W. VERNON & SONS, LTD. (in voluntary liquidation). General Meeting of Members of this company at 40, St. Mary Axe, E.C., on January 17th, at 3.30 p.m. Liquidator, E. Phillips.

Partnerships Dissolved.

HAND & CO. (T. HAND AND W. B. HAND), maltsters, Red Hill, Stourbridge, Worcester. Mutual dissolution, September 30th. Debts by T. Hand, who continues the business.

DONCASTER PICKLE CO. (C. WORTHINGTON DEAKIN AND W. H. MALLETT), pickle manufacturers, 109, Cemetery Road, Doncaster. Mutual dissolution, September 6th. Debts by C. W. Deakin, who continues the business.

Bankruptcy Acts.

Receiving Order and Adjudication.

BROADWELL, HERBERT HENRY, 45, Stanley Street, Kingston-upon-Hull, carrying on business under the style of "Broadwell & Co.," jam and pickle manufacturer. Receiving Order, December 3rd. Debtor's petition. Adjudication, December 3rd.

Companies Acts.

Winding-up Order and Appointment of Liquidator.

HULL BACON SMOKING CO., LTD., 20, Burnett Street, Bradford. (1 of 1927) Winding-up Order dated November 15th. Liquidator, A. Watson (with a Committee of Inspection), 4, Cannon Street, Manchester. Appointment, December 3rd.

Notices of Dividend.

THE INTERNATIONAL SALT CO., LTD., 158, Bishopsgate, E.C. (00127 of 1915) Second and final dividend of 7s. 6⅜d. per £, payable November 22nd, 1927, or any subsequent day (except Saturday), between 11 a.m. and 2 p.m. at offices of Official Receiver and Liquidator, 33, Carey Street, W.C.2.

THE WEST OF ENGLAND DAIRIES, LTD., Arch 49, Vauxhall, London. (1190 of 1918) First and final dividend of 11½d. per £, payable December 14th, 1927, or any subsequent day (except Saturday), between 11 a.m. and 2 p.m., at offices of the Official Receiver and Liquidator, 33, Carey Street, W.C.

New Companies

The undermentioned particulars of New Companies recently registered are taken from the Daily Register compiled by Jordan and Sons, Ltd., Company Registration Agents, 116-118, Chancery Lane, London, W.C.2.

MARGARINE UNION, LIMITED. (225816) Regd. November 14, 1927. Finsbury Court, E.C.2. To enter into an agreement with Naamlooze Vennootschap Margarine Unie, of Holland, to acquire, deal in and dispose of shares, stocks, debentures, or other securities; to carry on the bus. of bankers, capitalists, mnfrs. of and dlrs. in oils and oleaginous and saponaceous substances, and all kinds of unguents and ingredients, etc. Nom. Cap.: £3,100,000 in 1,500,000 preferred and 1,500,000 ordinary shares of £1, and 2,000,000 deferred shares of 1s.

Dirs.: Rt. Hon. the Earl of Bessborough, C.M.G., 22, Portland Place, W.1 (ch.).
His Excellency Dr. R. J. H. Patyn, Bankaplein, 3, The Hague, Holland, (v.-ch.).
R. Jurgens, Slationsweg, Nymegen, Holland.
A. Jurgens, Keizer Karel Plein, Nymegen, Holland.
E. Jurgens, Hoch Allee, Lockstedt, Hamburg, Germany.
H. Jurgens, Vordensteyn, Schooten, Belgium.
J. H. Tresfon, Warneford, Hampton Wick.
S. Van den Burgh, Wiltyangk, Wassenaar, Holland.
A. Van den Burgh, do.
L. Van den Burgh, 2, Hitzigstrasse, Berlin.
D. Van den Burgh, 50, Hans Crescent, S.W.
P. Rykens, Dennenheuvel, Wassenaar.

Remun. of dirs., as voted by the co. Qual. of dirs. (after February 1, 1928), £500.

BRITISH & COLONIAL STORES, LIMITED. (225848) Regd. November 16, 1927. To carry on the bus. of wholesale and retail grocers, etc. Nom. Cap.: £2,500 in £1 shares.

Permt. dirs.: W. S. Kirkup, The Laurels, Eaglescliffe, Durham.
Dr. J. Brownlee, 24, The Avenue, Middlesbrough.

Qual. of dirs., 100 ord. shares.
Remun. of dirs., as voted by the company.

BROOKS (MISTLEY), LIMITED. (225849) Regd. November 16, 1927. The Maltings, Mistley, Essex. To take over the bus. of W. H. Brooks & Son, cd. on at Mistley, and to carry on the bus. of maltsters, seed crushers, mnfrs. of linseed, cotton, and other cakes, etc. Nom. Cap.: £150,000 in £1 shares (70,000 pref. and 80,000 ord.).

Dirs.: W. H. H. Brooks, Park Lodge, Mistley (permt. dir. and ch.).
C. A. Brooks, Long Furrows, Mistley, Essex.
F. V. Crisp, "Treherne," Lawford, Manningtree, Essex.

Qual. of life dir., 2,500 shares; of other dirs., 250 shares.
Remun. of dirs., £50 each per annum.

DEVON FARM SUPPLIES, LIMITED. (225961) Registered November 19, 1927. To carry on the bus of mnfrs. of and dlrs. in grocery, provisions, foodstuffs, comestibles, and farm and dairy produce of all kinds, etc. Nom. Cap.: £1,000 in £1 shares.

Dirs.: J. F. Clarke, 199, Piccadilly, W.
Kathleen M. Spurgeon, 134, London Road, Kingston.

KRAFT CHEESE COMPANY, LIMITED. (226017) Regd. November 21, 1927. To acquire the trade mark "Kraft," and to carry on the bus. of mnfrs. of and dlrs. in milk, cheese, and butter, etc. Nom. Cap.: £100,000 in £1 shares.

Dirs.: J. L. Kraft, address not stated.
C. H. Howell, do.
E. Stranz, 154, Cholmley Gdns., West Hampstead, N.W.6.
A. T. Thorne, 53, Culmington Road, West Ealing, W.13.

Remun. of dirs., £5 per annum, and such further sum as may be voted by the co., divided between them.

HAMPSHIRE BIRRELL & COMPANY, LIMITED (225999) Regd. November 21, 1927. To carry on the bus. of fish mchts., curers, and salesmen, etc. Nom. Cap., £20,000 in £1 shares.

Dirs., L. Zollner, 10, Neville Street, Newcastle-on-Tyne (permt.).
W. C. Manifold, address not stated (permt.).
Eleanor M. Manifold, do.
T. Sigurdsson, 10, Neville Street, Newcastle-on-Tyne.

Qual. of permt. dirs., 100 shares.

DE BRY (DE PARIS), LIMITED. (225992) Regd. November 21, 1927. 64/66, New Oxford Street, W.1. To take over the bus. of chocolate mnfrs. and refreshment caterers cd. on at New Oxford St. and 1, Bucknell St., W., as De Bry (de Paris). Nom. Cap.: £3,000 in £1 shares.

Dirs.: M. Mitelman, 76, Cranley Gdns., Muswell Hill, N.10.
L. Vignaud, 13, York Place, Adelphi, W.C.

WHITEHEAD CONFECTIONERY COMPANY, LIMITED. (226058) Regd. November 23, 1927. Dewsnup Street, Ardwick, Manchester. To carry on the bus. indicated by the title. Nom. Cap.: £1,500 in £1 shares.

Dirs.: A. Cadman, 39, Radstock Road, Stretford, Manchester.
M. Ashley, 37, Hanbury Street, Miles Platting, Manchester.
J. B. Cadman, 122, Hulme Hall Road, Cheadle Hulme.
S. Marks, 290, Gt. Clowes St., Higher Broughton, Salford.

Qual. of dirs., £5 shares.

SEVERN VALE CIDER CO., LIMITED. (226053) Regd. November 23, 1927. Hill House, Bushley, nr. Tewkesbury. To carry on the bus. indicated by the title. Nom. Cap.: £2,000 in £1 shares.

Dirs.: E. D. Nicholson, Cheriton, Oswestry.
D. P. Morgan, Hill House, Bushley, Worcs.

Remun. of dirs., as voted by the co.

JAEGER, HART & COMPANY, LIMITED. (226105) Regd. November 25, 1927. 21, Mincing Lane, E.C.3. To carry on the bus. of produce brokers and genl. traders, etc. Nom. Cap.: £5,050 in 5,000 ordinary shares of £1 and 1,000 founders' shares of 1s.

Dirs.: B. T. Peyton, Orchard Cottage, Braywick Rd., Maidenhead (permt. mang. dir. and ch.).
C. R. Jaeger, 4, The Crescent, Surbiton, Surrey.
E. L. Hart, 26, Holly Park Gardens, Finchley, N.
A. Naef, 5, The Crescent, Surbiton.

J. R. CLARKE & SONS, LIMITED. (226104) Regd. November 25, 1927. 4, Richmond Terrace, Shelton, Stoke-on-Trent. To take over the bus. of a wholesale grocer, drysalter, and confectioner, cd. on at Shelton, as "J. R. Clarke & Sons." Nom. Cap.: £5,000 in £1 shares.

Dirs.: J. G. Clarke, 2, Richmond Terrace, Shelton.
Miss Phyllis M. Clarke, 2, do.
Nora Bourne, Basford, Watford Rd., Sudbury, nr. Wembley.

Qual. of dirs.: 100 ord. shares. Remun. of dirs. (except mang. dir.), as voted by the co.

C. H. ELKES & SONS, LIMITED. (226156) Regd. November 28, 1927. To carry on the bus. of bakers, etc. Nom. Cap.: £25,000 in £1 shares.

Dirs.: C. H. Elkes, 1, High Street, Uttoxeter.
S. H. Elkes, 21, Carter Street, Uttoxeter.

Qual. of dirs., £500 shares. Remun. of dirs., £20 each per annum (ch. £25).

IDEAL CONFECTIONS, LIMITED. (226163) Regd. November 28, 1927. 59, Whitefriargate, Hull. To carry on bus. as confectioners, etc. Nom. Cap.: £1,000 in £1 shares (600 ord. and 400 pref.).

Dirs.: J. O. Robinson, 59, Whitefriargate, Hull.
Mrs. A. C. Moody, 59, do.

Qual. of dirs., £50.

BUCKLEY JONES, LIMITED. (226203) Regd. November 29, 1927. 97, Gresham Street, E.C.2. To enter into an agreement for the purchase of all the shares of E. B. Jones and Co., Ltd., and to carry on the bus. of wholesale and retail provision mchts., grocers, etc. Nom. Cap.: £105,000 in 150,000 preference shares of 10/- and 600,000 deferred shares of 1/-. Minimum subsn., 7 shares.

Dirs.: P. L. Daniel, Fourcrosses, Chwilog, Carnarvonshire.
H. N. Letts, 5, Cornwall Gdns., Putney, S.W.
V. W. Bowden, 219, Gloucester Terrace, W.2.

Qual. of dirs.: £100 shares. Remun. of dirs., £150 each per annum (ch. £50 extra) and a percentage of the profits.

DIRECT COLONIAL MEAT COMPANY, LIMITED. (226247) Regd. December 1, 1927. 236, Central Meat Market, Smithfield, E.C.1. To take over the bus. now cd. on at Smithfield as the "Direct Colonial Meat Co." Nom. Cap.: £10,000 in £1 shares.

Dirs.: M. I. S. H. Kingwell, 226, New Cross Rd., S.E.14 (permt. mang. dir.).
Mrs. Isabella M. Kingwell, 226, do.
D. V. D. D. Kingwell, 11, Station Rd., Clacton-on-Sea.

Remun. of mang. dir., £3,000 per annum.

LAMMERTON, LIMITED. (226289) Registered December 2, 1927. 24, Coleman Street, E.C. To carry on the bus. of confectioners, refreshment-room proprs., grocers, etc. Nom. Cap.: £10,000 in £1 shares.

Dirs.: P. J. Stephens, Highfield, Overton Road, Sutton, Surrey.
G. O. Wood, 10, Devonshire Crescent, Roundhay, Leeds.

Qual. of dirs., £5 shares. Remun. of dirs., as voted by the co.

KODOWA REFRIGERATOR COMPANY, LIMITED. (226288) Regd. December 2, 1927. 34, Snow Hill, E.C.1. To carry on the bus. indicated by the title. Nom. Cap.: £10,000 in £1 shares.

Dirs.: C. F. Maria van Berkel, Wassenaar, Julianalaan, Holland (permt. mang. dir.).
Prof. Dr. W. H. Keesom, Leiden, Holland.
D. J. Monshouwer, Cornbroe, Village Rd., Enfield.
Dr. W. A. Slager, Ryswyk, Holland.

Qual. of dirs., £100 shares.

CLEMENT AND JOHNSON ENGINEERING COMPANY, LIMITED. (226303) Regd. December 3, 1927. 63, Queen Victoria Street, E.C.4. To carry on the bus. of bakery engrs. as formerly cd. on at Queen Victoria Street, E.C.4. Nom. Cap.: £1,000 in 700 preference shares of £1 and 6,000 ordinary shares of 1/-.

Dirs.: R. Clement, 10, Manor Lane, Lee, S.E.13 (permt. ch.).
E. C. Johnson, 58, Burlington Ave., Kew Gardens, Richmond.

Qual. of dirs., £100. Remun. of dirs., as voted by the co.

(*Continued on page 252.*)

Current Literature

Fruit and Vegetable Products

How Red Sour Cherries are Cold Packed. C. P. Lathrop. (*Canning Age*, December, 1927, 961.)

How to Treat Pests and Diseases of Canning Crops. H. D. Brown. (*Canning Age*, December, 1927, 945.)

Confectionery

Fruit Pectin in Confections. W. A. Rooker. (*Fruit Prods. Jour.*, November, 1927, 9.)

Chocolate Dragees. M. Reinstedt. (*Manuf. Conf.*, November, 1927, 26.)

The Alabaster Dragee. A. Schildberger. (*Manuf. Conf.*, November, 1927, 30.)

Bread Making

Rôle of Phosphates in Bread Making. R. A. Barackman and C. H. Bailey. (*Cereal Chem.*, 1927, 4, 400.)

Interpretation of Bread Baking Tests. L. W. Haas. (*Cereal Chem.*, 1927, 4, 389.)

Various

Relationship between Various Factors and the Ash Constituents of Milk. R. O. Davies and A. L. Provan. (*Welsh Jour. Agric.*, 1927, 3, 236.)

Buffers of Milk and Buffer Value. J. H. Buchanan and E. E. Peterson. (*Jour. Dairy Sci.*, 1927, 10, 224.)

Variations in the Chemical Composition of Cabbage and Sauerkraut. W. H. Peterson, E. B. Fred, and J. A. Viljoen. (*Canner*, 1925, No. 4, 19.)

The Fatty Acids of Seed Oils of Brassica Species, The Composition of Rape, Ravison, and Mustard Seed Oils. T. P. Hilditch, T. Riley, and N. L. Vidyarthi. (*Trans. Jour. Soc. Chem. Ind.*, 1927, No. 50, 457T.)

Some Ill-defined Acids of the Oleic Series, III. T. P. Hilditch, T. Riley, and N. L. Vidyarthi. (*Trans. Jour. Soc. Chem. Ind.*, 1927, No. 50, 462T.)

Vitamin A Potency of Irradiated Milk. G. C. Supplee and O. D. Dow. (*Jour. Biol. Chem.*, 1927, 75, 227.)

Vitamin A in Evaporated Milks made by Vacuum and Aeration Methods. R. A. Dutcher, H. E. Honeywell, and C. D. Dahle. (*Jour. Biol. Chem.*, 1927, 75, 85.)

Protective Tubes for Thermocouples for Determining Heat Penetration in Processed Foods. K. L. Ford and A. G. Osborne. (*Ind. and Eng. Chem.*, December, 1927, 1345.)

The Breakage of Bottles During the Pasteurisation Process. S. English. (*Glass*, October, 1927, 420.)

The Commercial Production of Apple Cider. J. H. Irish. (*Fruit Prods. Jour.*, November, 1927, 12.)

Pectin Jellies. G. Spencer. (*4th Colloid Syrup Monograph*, 1926, 302.)

Analysis

Determination of Fat Content of Flour and Milling Stocks. C. W. Herd. (*Cereal Chem.*, 1927, 4, 370.)

Comparison of the Babcock, Gerber and Roese-Gottlieb Methods for Determining Fat in Milk and Cream. (A. C. Dahlberg, G. E. Holm, and H. C. Troy. (*New York Agric. Exp. Sta. Tech. Bull.* 122, 1926, 13.)

Acid and Fat Content of Technical Caseins. J. Marcusson and M. Picard. (*Mitt. Materialprüf.*, 1927, 5, 122.)

Determination of Total Sulphur in Animal Tissues and in Foods. L. Lematte, G. Boinot, and E. Kehane. (*Ann. Chim. Analyt.*, 1927 (ii), 9, 296.)

Crude Fibre in Food. E. J. Magers. (*Jour. Amer. Dietet. Assoc.*, 1925, 1, 73.)

Determination of the Neutralising Value of Acid Calcium Phosphate in Baking Powder. C. W. Herd. (*Cereal Chem.*, 1927, 4, 347.)

Detection of Prohibited Vegetable and Coal-tar Colours in Foodstuffs. J. R. Nicholls. (*Analyst*, 1927, 52, 585.)

Analytical Study of Roasted Coffee Berries. J. M. Clavera. (*Anal. Fis. Quim.*, 1927, 25, 369.)

Decomposition of Free and Combined Cystine, with Special Reference to Certain Effects Produced by Heating Fish Flesh. L. H. Almy. (*Jour. Amer. Chem. Soc.*, 1927, 49, 2540.)

Use of Quinhydrone Electrode for Following Changes in pH in Swiss Cheese. P. D. Watson. (*Ind. and Eng. Chem.*, November, 1927, 1272.)

Purification of Palmitic and Stearic Acids. A. L. Wilkie. (*Trans. Jour. Soc. Chem. Ind.*, 1927, No. 50, 471T.)

Determination of Aldose Sugars by Means of Chloramine—T, with Special Reference to the Analysis of Milk Products. C. L. Hinton and T. Macara. (*Analyst*, December, 1927, 668.)

A General Method for Determination of Aldehydes in Essential Oils, with Particular Reference to the Determination of Citronellal in Java Citronella Oil and Citral in Lemon Oil. C. T. Bennett and M. S. Salamon. (*Analyst*, December, 1927, 693.)

Relation of the Hydrogen Ion Concentration to the Titratable Acidity of Milk. P. F. Sharp and T. J. McInerney. (*Jour. Biol. Chem.*, 1927, 75, 177.)

Determination of Chlorine and Sodium in the Milk of Certain Mammals. L. Barthe and E. Dufilho. (*Compt. rend.*, 1927, 185, 613).

Marzipan and its Substitutes. O. Keller. (*Zeit. Unters. Lebensm.*, 1927, 54, 78.)

Sulphur Dioxide in Beer. (*Brewers' Jour.*, 1927, 63, 436.)

Occurrence of Vanillin in Wine Distillates, Brandy, and Artificial Brandy. G. Reif. (*Zeit. Unters. Lebensm.*, 1927, 54, 90.)

Recent Patents

The following abstracts are obtained from recently published copies of the "Illustrated Official Journal" (Patents) by permission of the Controller of H.M. Stationery Office. Printed copies of full Patent Specifications accepted may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at 1s. each.

273,192. **Artificial flowers; confectionery**. W. LOEBEN. January 26, 1927.
An artificial flower has a solid centre of chocolate or other sweetmeat enclosed in tinfoil or the like and interchangeable.

276,813. **Storing and vending confectionery, etc.** H. S. WHITESIDE AND CO., LTD., AND H. S. WHITESIDE. July 30, 1926.
Contents, delivering; powder distributors.—A device for storing and distributing confectionery, cereals, granular substances, etc.

276,831. **Bakers' ovens**. BAKER, PERKINS, LTD., AND J. E. POINTON. September 1, 1926.
In a baker's oven having a circuitously arranged conveyor, doors are provided so that from the one position outside the oven goods can be placed upon or removed from the conveyor at different points in its course. The doors are fitted in a re-entrant angle of the end wall, and give access to trays passing over the adjacent guide wheels. By this arrangement goods requiring differing periods or conditions of baking can be passed through the oven simultaneously.

276,850. **Dough-dividing machines.** T. A. SIDDALL. October 11, 1926.

276,860. **Confectionery**. D. MCKINLAY. October 27, 1926.
Chocolate and other confectionery is treated after manufacture with ultra-violet rays from a quartz mercury vapour lamp to increase the vitamin content to an amount corresponding to or in excess of that of the original ingredients in a raw state.

276,907. **Bread rolls.** C. GOTTFRIED. April 4, 1927.
Dough-working machines.—A machine for shaping balls of dough into Vienna rolls comprises a series of cups adapted to receive a ball of dough and to move into relationship with a shaping-die.

276,926. **Yeast preparations.** C. DOCTOR. May 10, 1927.
A yeast tablet, particularly for medicinal purposes, comprises layers of dried chocolate powder intimately pressed into association with dried or powdered yeast so as to form a protective envelope for the yeast and impart to it a palatable flavour. The layers may be compacted in a die-plate by hand pressure devices or by power driven tablet making machinery, the dried chocolate powder being fed from hoppers above and below the yeast layer.

277,222. **Milk coolers**. BARFORD AND PERKINS, LTD., AND F. A. PERKINS. February 7, 1927.

277,400. **Starch**. F. B. DEHN (Penick and Ford, Ltd., Inc.). April 19, 1926.
In the manufacture of starch from corn, the bulk of the water which has passed over the starch tables and afterwards has been separated from the gluten, is sterilised so as to arrest or prevent fermentation, and is reused together with make-up water to treat fresh starch bearing material. The water is preferably heated to about 160° F. in order to arrest fermentation.

277,476. **Yeast**. INTERNATIONAL YEAST CO., LTD. (Fleischmann Co.). August 24, 1926.
In the manufacture of yeast, wort of low gravity such as 2° Balling containing water, seed yeast and enough nutrient to increase the seed yeast by one-half is fermented in a closed or open fermenter at, *e.g.*, 31-33° C. with aeration until the yeast content is increased by one-half. One-third of the yeast-containing liquid is then removed, and water and nutrients added to compensate for evaporation and the using up of the nutrient. The fermenter may be 11 feet high and 4 feet in diameter, and the nutrient consists of sugar, grain and inorganic nitrogen compounds such as ammonium phosphate, ammonium sulphate and aqua ammonia. More than twenty successive yields may be taken in this way. Specifications 155,284 and 238,554 are referred to.

277,572. **Starch**. E. C. R. MARKS (Corn Products Refining Co.). April 8, 1927.
Starch manufacture comprises steeping and disintegrating the corn or other starch-bearing material, separating germ, bran, and fibre, tabling the starch and gluten to remove the gluten and water, filtering the starch with fresh water to remove solubles and using the water from the gluten for treating further material, a part in the steeping and the balance in the germ and coarse slop preparation, while the filtrate from the starch is used, preferably heated, in the fine slop separation.

277,587. **Washing fruit, vegetables, etc.** R. SPEIDEL. June 9, 1927.

277,770. **Stoning fruit.** H. LEONHARDT. July 12, 1926.

277,797. **Cooling milk.** J. WILLETT. September 8, 1926.

277,117. **Grinding chocolate, etc.** F. G. FRYER. June 11, 1926.
Disc and like mills.—Relates to reducing, grinding, or refining apparatus for chocolate, cocoa, etc., of the kind comprising relatively rotatable metal reducing discs which are pressed together under yielding pressure. Each disc is provided with reducing walls

forming reducing surfaces so arranged that the total area of all those elements of reducing surface which lie in an elemental annular disc-area increases more or less proportionately with the radius of the elemental annular disc-area.

277,182. **Dough-dividing machines.** J. S. WITHERS. (Habaemfa Hallesche Backereimaschinen-Fabrik, Rausch and Filbry). October 11, 1926.
In dough-working machinery, of the type in which a hinged pressing and dividing head is lowered by hand on to the mass of dough prior to the pressing operation, mechanism on the main frame of the machine is adapted to couple with and uncouple from the press-plate automatically.

278,413. **Tea manufacture.** G. N. THOMSON. June 30, 1926.
Rubber or other resilient lining is employed for some or all of the parts of tea rolling machines that come into contact with the leaf—*e.g.*, the leaf receptacles or cylinders, the ploughs, the rolling tables, and the discharge trays. The surface of the lining may be roughened, grooved, or undulated. Crepe or vulcanised rubber may be used. The lining may be positioned by screws or other mechanical means, by adhesives, or by vulcanising.

278,426. **Tea manufacture.** T. A. CHALMERS. July 5, 1926.
In the manufacture of tea, the tea is cut after rolling but before firing. All the leaf, whether coarse or fine, may be cut after rolling or fermenting, but preferably the leaf is first rolled, the buds and fine leaf being separated. The rolled coarse leaf is cut, fermented (after rerolling if desired) and fired. In a modification, the rolled leaf is fermented and then cut and fired.

278,653. **Cereal and other food preparations.** V. D. ANDERSON CO. March 19, 1927. (Not yet accepted.)
Cereal and other human and animal food products are made by subjecting food to high pressure, to generate heat therein, and forcing water into the mass while it is under compression and hot.

(*Continued from page 249.*)

GEO, LIMITED. (226331) Registered December 3, 1927. To carry on the bus. of provnl. mchts. and dlrs., bakers, and confectioners, etc. Nom. Cap.: £1,000 in £1 shares.

Provisional dirs.: Guy M. F. Morel, Ashburton Hotel, Richmond.
J. A. Steemson, 35, Auckland Rd., S.W.11.
Qual. of dirs., none required.

LEVAL, LIMITED. (226333) Registered December 3, 1927. 148, Victoria Street, Burton-on-Trent. To carry on the bus. of mnfrs. of extracts of or from yeast, hops, and grains, etc. Nom. Cap.: £2,000 in £1 shares.

Dirs.: C. W. Sharp, 1, The Crescent, Hipperholme, nr. Halifax.
G. C. Lowe, Barton-under-Needwood, nr. Burton-on-Trent.
H. L. Lamb, do.
Qual. of dirs., £50. Remun. of dirs., as voted by the co.

JOHN CHARLES & JONES, LIMITED. (226365) Regd. December 6, 1927. 212, Duke Street, Barrow-in-Furness. To carry on the bus. of grocers and provision mchts., etc. Nom. Cap.: £3,000 in £1 shares.

Dirs.: J. H. Charles, 19, Norfolk Street, Barrow-in-Furness.
H. E. Jones, 107, Greengate, Barrow-in-Furness.
Qual. of dirs., one share.

R. BENNIS & CO., LIMITED. (226392) Regd. December 7, 1927. To carry on the bus. of wholesale grocers, etc. Nom. Cap.: £2,000 in £1 shares.

Permt. dirs.: R. Bennis, 194, Bow Rd., E.3 (mang. dir.).
I. Cohen, 43, Downs Rd., Clapton, E.5.
Qual. of dirs., one share. Remun. of dirs., as voted by the company.

SETCH MANUFACTURING COMPANY, LIMITED. (226399) Regd. December 7, 1927, 80, Bishopsgate, E.C. To carry on bus. connected with the fish industry or other marine products, etc. Nom. Cap.: £5,000 in £1 shares.

Dirs.: W. H. Haslam, 8, Hanover Terrace, Regent's Park, N.W.1.
R. Purbrick, 43, Green Street, W.1.
J. de Vere Loder, M.P., Jaques Hall, Manningtree, Essex.
E. R. B. Farrer, 19, Lansdowne Crescent, Holland Park, W.11.
E. Murray, 82, Muswell Rd., Muswell Hill, N.10.
W. F. Pemberton, 77, Monkhams Avenue, Woodford.
Qual. of dirs., none required.

GEO. H. GILL, LIMITED. (226430) Regd. December 8, 1927. Queen Street, Bollington, nr. Macclesfield. To take over the bus. of a mineral water mnfr. cd. on at Bollington as "Geo. H. Hill." Nom. Cap.: £1,150 in £1 shares (450 pref. and 700 ord.).

Dirs.: G. H. Gill, 21, Greenfield Rd., Bollington (permt.).
Mrs. G. Gill, 21, do.
Qual. of dirs., £50 shares. Remun. of dirs., £10 each per annum (ch. £25).